MEMOIRS

OF THE

NATIONAL MUSEUM OF VICTORIA

MELBOURNE

(World list abbrev. Mem. nat. Mus. Vict.)

No. 24

Issued 18th December, 1959

C. W. BRAZENOR, DIRECTOR

PUBLISHED BY ORDER OF THE TRUSTEES

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CONTENTS

SIR BALDWIN SPENCER'S RECORDINGS OF AUSTRALIAN ABORIGINAL SINGING.

*By Alice M. Moyle**, M.A.(Syd.).Mus.Bac.(Melb.).

Introductory Note.

Sir Baldwin Spencer's phonograph recordings (1901 and 1912) in the National Museum of Victoria were dubbed on tape in July, 1957. I auditioned these and made a few fragmentary transcriptions during a short visit to Melbourne the following August.

Considering the age and inevitable crystallising of the wax cylinders, sound-transcription is remarkably successful. This was achieved by fixing a diamond stylus from the original reproducing head to a crystal pick-up. Surface noise was reduced by filtering. Except in one or two places (see Record Annotations) the singing with " stick " and " conch " accompaniment may be clearly heard.

To check tape announcements (by the audio engineer) with Spencer's own spelling of the aboriginal titles, I was granted permission to visit the Museum's strong room where the cylinder collection was kept. There I found 4 large 4¼ inch (internal diameter) and 26 small 2 inch cylinders. Numbers, dates and titles, presumably in Spencer's hand, were written on the outsides of the cardboard box covers. Most of the small boxes were marked N.T.1912.

Three titles on the larger boxes did not agree entirely with Spencer's spoken titles as I had just heard them on tapes. I was interested to note that these corresponded with some in another set of records made by Spencer in 1901 which I had previously heard in Adelaide (1956), also dubbed on tape.

At some stage in their history, the 1901 cylinders—including possible duplicates—became divided and the box covers changed about. Those in Adelaide (Section 5), which are fitted in a carrying case with felt-lined lid and cylinder supports, were probably selected for a special purpose.

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* Mrs. John Moyle, author of "Know Your Orchestra" (Cheshire's) which she wrote as Alice Brown.

At the commencement of each Record Annotation will be found my copy of Spencer's box number, title and comments. Some were not easily deciphered and I may have misinterpreted these.

ACKNOWLEDGMENTS.

The following musical analysis forms part of a project on the intervallic structure of Australian aboriginal singing undertaken in the Department of Music, University of Sydney, with assistance from the University Research Grant.

Acknowledgment is also made to the Director of the National Museum of Victoria, Mr. C. W. Brazenor, who kept me informed of re-recording proceedings, and, on my arrival in Melbourne, supplied me with a first-class machine for playing the tapes.

I. SPENCER'S REFERENCES TO THE RECORDINGS.

W. Baldwin Spencer made his first recordings of Australian aboriginal singing at Stevenson's Creek and Charlotte Waters in March and April, 1901. As pioneer in this field, his claim (1928, p. 355) has not been disputed.

An earlier collection of wax cylinders was played before the Royal Society of Tasmania in 1899, but the singer's mother was allegedly a Tasmanian aborigine.[1]

Spencer's recordings were made on a large Edison phonograph, the gift of Dr. Angus Johnson in Adelaide and with the cinematograph used on the same expedition, it was regarded at the time as " magnificent equipment " (Thomas, 1901).

After taking the train from Adelaide to the terminus at Oodnadatta Spencer, then Professor of Biology at the University of Melbourne, and F. J. Gillen, Special Magistrate and Sub-Protector of the S.A. Aborigines, followed the telegraph line to Alice Springs. During this earlier stage of their journey, which proceeded further north, the 4¼ inch cylinder-recordings were made.

The novelty of hearing themselves " played back " at first alarmed the aborigines but Spencer and Gillen soon found, as others have done since, that little coaxing was needed to get them to sing near the machine. Children were always too shy to perform—the reason, perhaps, for the disappointing dearth of children's singing in all record collections.

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1 Fed. Record Library, A.B.C. Sydney 4 songs on 16 inch disc.

Comparing Spencer's method of recording with his own, Davies (1927) believed that better results could be obtained by selecting and bringing one or two natives to the phonograph horn than by attempting to record the entire group.

It is true that Professor Davies obtained good vocal definition this way, although the instrumental accompaniments on his recordings[2] are not always audible.

From Spencer's records, many of which have captured the sound of accompaniments such as calls, thuds and other percussive noises, a clear impression may be obtained of the general style of the ceremony and of the song's actual part in it. And, despite these background sounds, melodic outlines are not obscured. Moreover, " actuality " recordings, in which Professor Elkin has also specialised, can demonstrate (with the help of descriptive notes made on the spot) the parts taken by soloists, group and, to some extent, dancers. Recorded male and female voices are not always clearly distinguishable. Some female voices have a harsh, chest quality, others are nasal and strident, depending, no doubt, on the age of the women. Two women's corroborees may be heard on Spencer's cylinders Nos. 9 and 16 (1912).

In his diary (1901) Spencer gives an account of conditions under which the first records were made. Extracts which refer to the phonograph are given below:—

Camp 4—Stevenson River.

March 22 The phonograph is a beauty! It was given to us in Adelaide and we can both take records with it and repeat them as soon as they are taken. Gillen and myself felt quite happy to be amongst the blacks again and to hear the old corroboree songs once more and I don't know whether we or the natives were the more excited.

Camp 9—Charlotte Waters.

March 28 This evening we have had the phonograph at work again and shall soon have done with this and shall send it back again. It has been a success and we have got some good corroboree songs.

March 29 Today we have been at work again with the phonograph. First of all we got 2 lubras to talk as if they were having a quarrel which they did in real earnest and then we made them end up with a peal of laughter.

[2] Col. (Aust.) PRX 9–11 (12 inch standard).

The language they used can't well be translated but it sounds splendid. After that we did the same with two men, but it is not quite so good. Then the women sang corroboree songs . . .

March 30 The natives have not come in yet and all we can do is wait patiently for them. I have the cinematograph ready to work when they do come. They are going to give us some rain dances during which they will wear great big head dresses and look very grotesque.

March 31 . . . Last night we got some more phonograph records—one or two especially good rain songs in which two men imitated at intervals the cry of the curlew which came with the rain.

April 1 The natives are gradually coming in . . . they have promised to give us a corroboree tomorrow so that I shall have the chance of using the cinematograph for the first time.

April 2 The natives came in bringing some special sticks like huge bull-roarers from a place about 25 miles off. They are now decorating them with designs in red ochre and charcoal and white clay in a quiet spot down by the water-hole so that the women cannot see them. They are going to perform tomorrow.

April 3 . . . in the evening we had the natives up for a last go at the phonograph. We only had material for three songs and when we had taken these and let the men hear them we packed the machines and records up ready to go back to Adelaide by a team starting down in the morning.

Spencer makes further reference to the 1901 records: (1928 Vol. I: 361):

> The wax cylinders that we had to use were so large —they were between 5 and 6 inches in diameter[3]—that I was afraid to risk carrying them further north, not only because of the heat, but because of travel on camel-back, which was the only means of transport, so I thought it safer to use them all whilst we were in camp at Charlotte Waters, pack them up and send them south from there, so as to avoid as much travel on camel-back as possible. As it was, 8 out of the 36, despite careful packing, were cracked and spoiled during transit.

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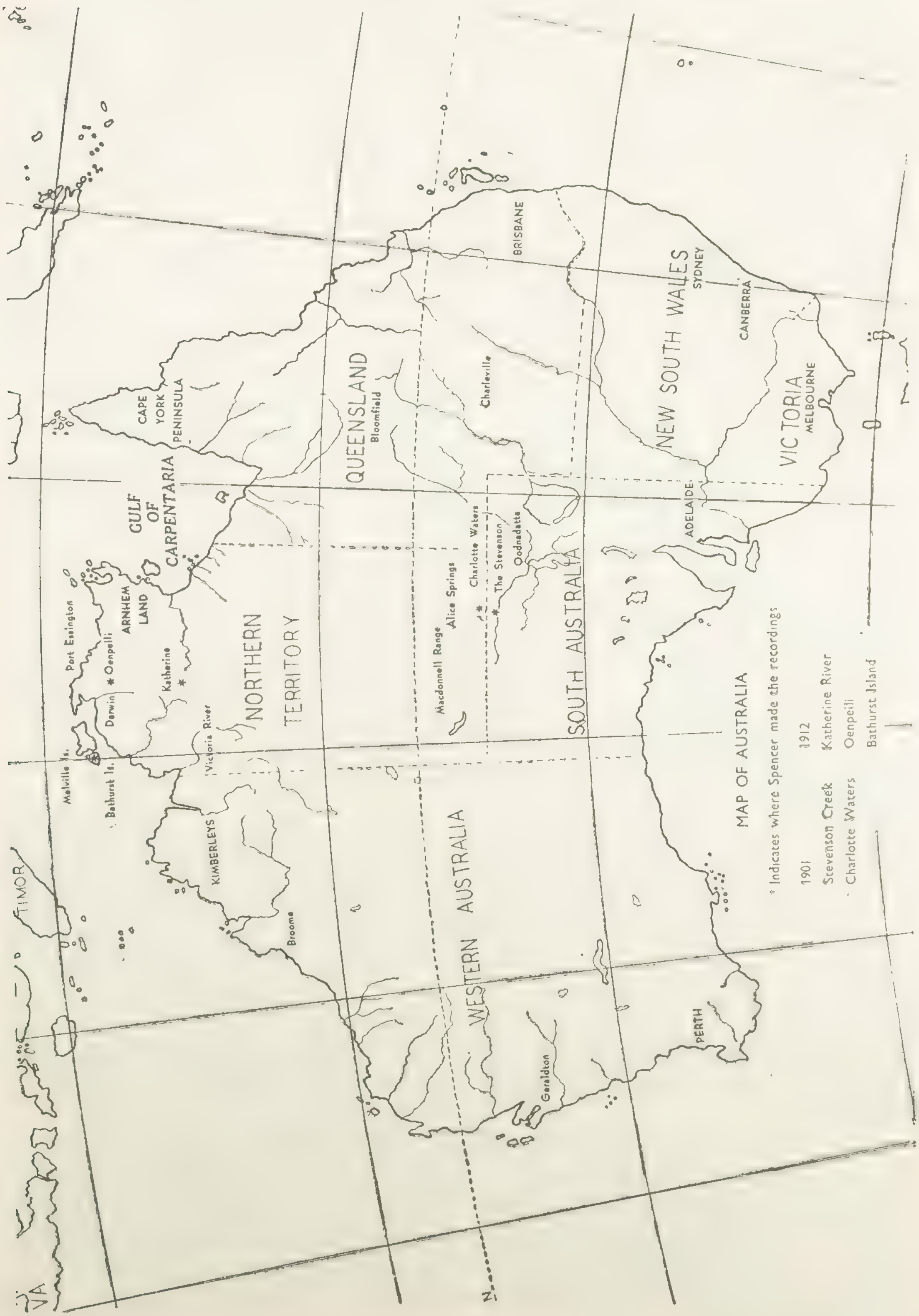
[3] This would be a generous estimate of the external diameter A.M.


MAP OF AUSTRALIA
* Indicates where Spencer made the recordings
1901
Stevenson Creek
Charlotte Waters
1912
Katherine River
Oenpelli
Bathurst Island
TIMOR
Melville Is.
Bathurst Is.
Port Essington
Darwin
Oenpelli
Katherine
Victoria River
ARNHEM LAND
KIMBERLEYS
Broome
NORTHERN TERRITORY
GULF OF CARPENTARIA
CAPE YORK PENINSULA
QUEENSLAND
Bloomfield
Charleville
BRISBANE
Macdonnell Range
Alice Springs
Charlotte Waters
The Stevenson
Oodnadatta
WESTERN AUSTRALIA
SOUTH AUSTRALIA
ADELAIDE
NEW SOUTH WALES
SYDNEY
CANBERRA
VICTORIA
MELBOURNE
Geraldton
PERTH

The total number of wax cylinders used during Spencer's excursions to Katherine River, Oenpelli and Bathurst Island in 1912 is not known. But more of these smaller reels appear to have survived transit from the Northern Territory and other possible hazards. By 1912, phonographic equipment was lighter, more compact and the cylinders more durable. Twenty-six of these have been successfully dubbed on tape, not excluding three unidentified specimens.

For verifying the dates of some of the later recordings, further quotation is made from Wanderings in Wild Australia (Vol. II:891ff):

> After our motor trip (from Katherine to the Gulf of Carpentaria then south to Newcastle Waters) Dr. Gilruth[4] had gone to Darwin and I stayed behind at the Katherine waiting for Cahill, who came in from the Roper on October 26th. I had sent down to Melbourne for a phonograph and fortunately it had come in time for Cahill to bring it with him, so we managed to secure some good results of native corroborees and ceremonial songs.
>
> Nov. 4 We packed up and today Cahill and myself started off for the Flora River, when we hoped to come in contact with one or two tribes, more especially the Waduman and Mudburra who live in the Victoria River country. (See records Nos. 12 and 21 A.M.)

On November 29th, 1912, Spencer left Darwin for Bathurst Island.

> Dec. 2 (Bathurst Island) . . . I had brought the phonograph over so we were able to get not only cinematograph records of the dancing, which include the usual ones, buffalo, crocodile and sailing boat, but also very interesting phonograph records of the songs associated with the ceremony. (See records Nos. 3, 4, 6, 16 and 20 A.M.)

An entry in Spencer's diary for Saturday, October 26th—Monday, November 4th, 1912, at the Katherine Telegraph Station, reads:

> . . . With the aid of Cahill I have got some very good phonograph records here . . . They are the same as Gillen and I got before with just slight differences (marginal note: really are quite different) in that one or two of them are more interesting because a kind of trumpet made out of a hollow branch was used.

[4] Dr. J. A. Gilruth, Administrator of the Northern Territory.

II. ACCOMPANYING INSTRUMENTS.

Sound-accompaniments to the singing are profuse in the 1912 series of recordings.

Apart from vocal accompaniments, which include ceremonial calls and shouts, a variety of rhythmical percussive sounds are audible such as claps, thuds (stamping?) and the striking together of special pieces of wood or " sticks ".

These rhythm sticks are of various shapes and sizes and have been observed in Central Australia (Spencer 1899, p. 604) and in Arnhem Land (Elkin 1953, p. 94). An especially heavy pair was recorded by C. P. Mountford on Groote Eylandt (picture on p. 31).

Peculiar clattering sounds betray the presence of boomerangs which are struck together, two to each player. In the record titles these are apparently included among the " sticks ". Singing to the accompaniment of beaten boomerangs—broader, flatter and more curved than the sharp-angled, returning type (see picture p. 31)—has been recorded many times in the centre, also in the west and north of the continent.

Also recorded on the 1912 series are accompanying sounds made by the " conch ", Spencer's name for the Australian wooden trumpet, currently called the " didjeridu "* (p. 32).

Spencer's recordings of the " conch " are important. Those from Bathurst Island (cylinder Nos. 4 and 6) point to a wider distribution of this " aerophone " (Sachs 1940) than is indicated by later recordings from Arnhem Land and the Kimberleys. And the sample from the Katherine (Cylinder No. 24), in which several " conches " deliver high-pitched, unmusical sounds is unique among Australian records. These, surely, are the " horn blasts " to which Davies (1927) referred.

In style, the Nabakawulla conch accompaniment (Cylinder No. 6) is similar to didjeridu droning in the west and north-west of Arnhem Land. (Transcription Ex. 4 and Record Annotations to Cylinder No. 6 p. 21.)

The Bathurst Island performances may have resulted from a recent importation of the trumpet from the mainland. It is possible that didjeridu players from Port Essington accompanied Cooper to Melville Island. Spencer however, says nothing of a

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* Dr. H. Basebow (1925). The first writer to use the term "didgeridoo", observed that the player blew with a vibratory motion of the lips and at the same time sputtered into the tube indistinct words which sound like "tidjarudu, tidjarudu, tidjaruda" (p. 375).

new importation. On the contrary, he seems to imply a wide spread and already well-established use of the conch on Bathurst and Melville Islands.

The other conch accompaniment from Bathurst Island (Cylinder No. 4) shows more variation. In addition to sustained notes (Trans. Ex. 3c) there are notes of shorter duration, a fifth higher in pitch. Didjeridu accompaniments sounding two notes of different pitch have reached a more advanced musical stage in the rhythmic " obbligatos " of north-east Arnhem Land. Transcriptions of some of these have been made by Jones (1956).

High-pitched conch " blasts " in the " Tjadpa " corroboree (cylinder No. 24) do not resemble the upper partial, or " hoot " notes audible in didjeridu recordings which Professor Elkin made in north-east Arnhem Land. Sound-distortion during recording could not be wholly responsible for the cruder effects on the wax-cylinder No. 24.

An eye-witness account at the time of recording may have supplied the missing information. Now the listener can only guess at the cause. The " blasts " may have been produced from a short tube; the method of blowing may have differed; or the blowers may have been learners.

Exact measurements of individual trumpets, since recorded in various places in the north, are not available. Experimenting myself, with a tube which measured 3 ft. 8½ in. in length, 1 in. internal diameter at mouth end and 1⅜ in. internal diameter at other end, I was able to produce several notes, the strongest of which was approximately 82 cycles, or the first " E " below the Bass stave. In contrast to this the pitch of the recorded " blasts " is approximately E/5 (660 cycles).

Spencer's use of the term "conch " may have been prompted by a knowledge of the wooden trumpets of New Guinea (Haddon 1917), some of which were representations of the coastal conch or " shell trumpet ". Although Spencer makes not direct reference to these his comment (1928 Vol. II.) on the instrument played by the Bathurst and Melville Islanders implies comparison: It is " commonly called a trumpet by the whites, but really a kind of conch, made out of a hollow bough ".

Elsewhere (1914), Spencer mentions two types of trumpets, (1) those made out of a hollow branch of gum trees, ironwood, etc., and (2) those made from bamboo. (p. 389).

" In the case of the gum trees there is no difficulty in regard to the hollowing out. It is very rare, in any of the northern parts

of the Territory to find any branches which are not hollow, so that the native can easily secure one that is suitable for a trumpet ".

" In the bamboo, the partitions that pass across the nodes have to be removed by means of a fire stick. As a general rule, the mouth end is coated with wax so that the lips can fit on tightly " (p. 391).

Spencer noticed considerable variation in the ability of tribal trumpeters. " In the Kakadu, for example, there is one man who is notably good and will imitate wonderfully well the calls of various birds such as the native companion. When in camp he is constantly asked to perform and the natives listen to him by the hour ". (p. 390).

Trumpet imitations of bird calls were also noted by Roth who alludes (1902) to an aboriginal legend about a wooden trumpet used " by certain sprites for that purpose long before they themselves (the aborigines) knew how to use it ".

The Queensland trumpet, or " yiki-yiki " was heard in areas defined by Roth, which included part of Cape York Peninsula, also Bloomfield. Sometimes it measured 7-9 feet in length and was played resting on a forked stick. Unlike the bull-roarer, the yiki-yiki was not excluded from camp singing among north-east Australian tribes.

Only a few wooden trumpets have been reported as far south. Keith Kennedy (1933) saw one at Geralton W.A. in 1925.

The " ilpirra " or " ulpirra ", a tube of shorter length, which Spencer and Gillen described as " a rudimentary trumpet " was used by central tribes in love-magic ceremonies.

Spencer and Gillen implied that the ilpirra was not a tone-producing instrument but one used merely to " intensify " the singing voice. (1899: p. 607.)

Voice-disguising for magic purposes, aided by different kinds of resonators, is not unknown among primitive peoples. This may well have been practised at some period in Australia, especially where " tubes " were plentiful. At the same time the practice does not necessarily rule out the possibility of musical tone produced by normal (lip-reed) aerophonic vibration, i.e., by blowing through tightened lips thus causing the air to vibrate within the tube.

At Alice Springs, during the " Atnimokita corroboree ", Dr. Stirling (1894) saw a trumpet which measured 2 feet in length, diameter at larger end $2\frac{1}{2}$ inches, at mouth end 2 inches ".[5] On the

[5] A similar specimen is exhibited in the Nat. Mus. of Victoria.

third night of the ritual, he heard " dismal notes " extracted from " a straight wood trumpet made out of a piece of mallee (Eucl. sp.) from which the heart wood had been eaten out by termites " (Vol. IV. p. 756).

And in the section on Musical Instruments (p. 100) Stirling (a physiologist) reported that " by sending the voice through the trumpet the reverberations of the naso-pharynx were intensified and a *monotonous droning sound* produced " (my italics).

In attempting to answer the question whether the Central ilpirra " players" achieved tonal results resembling those of the Arnhem Land wooden trumpets, Stirling's description must be considered; also Spencer's and Gillen's descriptive terms, " rudimentary trumpet" and " primitive conch ".

" Monotonous droning " could be loosely applied to some styles of northern didjeridu playing, including Spencer's recording of the " conch " on Bathurst Island (No. 6.).

The " primitive conch " of Central Australia may have produced " blasts " as well as droning, although there is nothing in Spencer's writings to indicate this.

Unfortunately no recordings have come to light of an ilpirra or a yiki-yiki accompaniment. The chances that any were made are remote. But it does seem likely that the production of basic tube tone (not necessarily with present-day Arnhem Land refinements) has been more widely practised in Australia than available recordings indicate.

Compared with the more general distribution of " stick " and boomerang accompaniments it could be argued that the wooden trumpet accompaniment to aboriginal singing is a later comer to the Australian musical scene. Its frequent employment in Arnhem Land suggests that the instrument (or the idea of using it) entered the continent here from the north, possibly as a wooden imitation of the shell trumpet. Then, highly favoured in song and dance ceremonies, it doubtless spread east through the Gulf country (Roth), west to the Kimberleys and south as far as the MacDonnell ranges.

III. VOCAL FEATURES.

In recent years, with improved equipment, several collections of recorded aboriginal singing have been made in the centre and the north, regions well-studied by anthropologists.

Collections from the east and south-east are woefully sparse but in all we have enough to show common vocal tendencies, differing styles of accompaniment, even possible " stages " in melodic development[6].

There are few exceptions in Spencer's recordings to the Australian song procedure of commencing at the highest note and ending on the lowest. And none of these substantially alters the downward direction of the singing.

Many of the monotone chants also demonstrate this prevailing tendency by annexing intervals which fall in pitch.

The rhythmic reiteration of the ground tone (Trans. 10a, 11) and the retracing of steps about the upper vocal boundary (Trans. 4, 8, 11) are also common Australian characteristics.

Careful analysis is needed to distinguish between the multiplicity of song-descents which, taken together, constitute one " song-cycle " or full song-ceremony. Noticable variation in the mode, or intervallic sequence, musically distinguishes one cycle from another, and there are also smaller differences to be found between one song-descent and the next (Trans. 3a, 3b).

Ascending intervals occur, either because of a retracing of steps to prolong the descent, or—more rarely—as prefixes to the main descent (Trans. 3c, bars 1-4 and 10a, bars 1-2).

One song-descent may immediately follow another at a higher pitch, necessitating a wide vocal leap from the ground tone of the first descent to the second apex (Cylinder Nos. 18, 26, 27). Singing in this " north-western "[6] style has been recorded in Western Australia (near Broome) and on the west coast of the Northern Territory.

I have labelled these recurring vocal leaps (from groundtone back to the original apex) " ambit " intervals.

Paradoxically, " ambit " intervals are not melodic intervals. They may be known only after the melodic descent has been completed (Trans. 2). The " ambit " is more than a theoretical abstraction, such as scale or compass; its function from one song descent to the next, in the strong downward " pull " to the ground-tone and released swing upwards, is best described as " magnetic ".

Tones above the ambit (Trans. 8, 11) may be regarded as an accessory to the main descent.

[6] The Intervallic Structure of Australian Aboriginal Singing (M.A. Thesis 1957).

An ambit of a certain size may be associated with songs recorded in one particular region, e.g., the minor third ambit of some of the Central Australian songs. And, as one might expect, the ambits of the " Arunji " recordings which Spencer made in 1912 (Nos. 2, 8, 15, 18, 19, 25, 26 and 27) are the same (octave).

There have been instances of changes in the intervallic sequence of song-descents in the same song-cycle recorded on more than one occasion. This was so with the Warranggan (Djauan tribe) corroboree (not unlike Spencer's " Arunji ") which Elkin recorded in 1949 and again in 1952. (Jones 1956.)

The resemblance of aboriginal song-descents to diatonic modes in Western musical theory has frequently been noted. Similarities noted here (see Record Annotations Nos. 3, 6, etc. 1912) are based on immediate aural estimates.

Accurate measurement of the recorded frequencies, and calculation of the intervals in cents is beyond the scope of the present study. The use of such terms here as " octaves ", " fifths ", " major thirds ", " minor thirds ", etc. indicate intervals closest in effect to their equal-tempered equivalents.

If played on the piano, the accompanying musical examples will only vaguely copy the actual sounds. Transcribed examples therefore are intended merely as a pointer to the singing.

In Spencer's collections I have found, so far, only one instance of a " pentatonic " mode of descent. This occurs in the third and fourth song-descents of the Bathurst Island corroboree. It is to be found on Cylinder No. 4 in the 1912 series (Trans. 3b). The descending intervallic sequence here is: tone (major 2nd); minor third: tone: semitone. This sequence is not that of " anhemitonic " pentatonism associated with the black keys of the piano.

Among the earlier (1901) cylinders is a short, repeated polka-like phrase which immediately attracts the ear. Compared with irregular or " free " aboriginal rhythms this strict, isometric sample has an unusually tuneful quality. (Tape III., first of the large cylinders. Trans. 13).

A large proportion of monotone chanting is to be heard on these earlier recordings. Time patterns (Trans. 14) are closely related to the repeated word-or syllable-groups.

In the accompanying transcriptions the sung syllables, or " song-texts " have been omitted. These may be difficult to obtain[7], and intelligible translations, still more so.

[7] Spencer (1928) transcribed a few song-texts.

Musicological importance of the sung syllables lies not with their meaning—which, even if known may not be constant—but in their number, rhythm and repetition.

Within one song-descent a short " text " may be wholly repeated, partially repeated and with additions which may be spontaneous. It often becomes apparent that changes in the song rhythms are paralleled by changes in the syllable groups.

A particular " verse " style may well be a vital determinant in aboriginal song-style; conversely, the style of the singing may substantially alter the length of the syllables in the " text ".

In unwritten singing of this kind close investigation of the relation between melody and " text " is necessary for a full understanding of the nature of each. Musicological advance along these lines will need linguistic reinforcement. But it is still possible—indeed it is a necessary preliminary—to first examine the intervallic and rhythmic elements of the sung tones in their separation from the syllables.

IV. RECORD ANNOTATIONS.

A brief description of the singing and accompaniment as heard on each cylinder is given below. Spencer's numbers and titles, as I deciphered them from notes written on the outsides of the cylinder-containers, are included to aid identification. Except for No. 9, which comes first, the smaller 1912 cylinders have been dubbed in numerical order. The four earlier cylinders follow these at the end of Tape III. and the beginning of Tape IV.

Tape I.

Box-title: No. 9 Woman's Corroboree, Katherine Creek, N.T., 1912.

Female group singing. Percussive accompaniment, which does not synchronize, is probably produced by clapping or striking the thighs with cupped hands, a common practice among aboriginal women during singing and dancing.

The " ambit " interval (see vocal features) is a 5th. The 6th above is heard in its role of *appogiatura*, and is slurred in its descent to the 5th. (Example 1.) Other notes in the descent are not as clearly distinguishable. Irregular grouping of the time-units (notated as crotchets) is not an unusual feature in Australian singing. Bar-lines are added merely to aid recognition of recurring groups. No accentuation is implied.

The date, 1/11/12, found inscribed on the cylinder, is announced on the tape.

Box-title: No. 1 Corroboree, Katherine River, N.T., 1912 Sticks, one voice, final shriek.

Solo chanting on one tone. Approximate pitch A/3[8] (Top line Bass stave). Group-shouting, yells and thuds ultimately resolve into a swinging (3/4) rhythm. Yells preceded by short shouts are frequently heard in Northern Territory ceremonies. The total effect is not unlike a loud, concerted sneeze.

Box-title No. 2: Arunji (Snake Corroboree), Katherine Creek, N.T., 1917 (?) sticks good.

(The figure 7 is surely intended for 2. In the Melbourne Museum's collection, no other records are so dated.)

The "sticks" may be boomerangs—or assisted by boomerangs—(Accompanying Instruments). These slow down to a beat of longer duration when the ground tone is reached. The "ambit" interval is an octave. There are two structural intervals of a fourth (Ex. 2). Each song-descent is varied to some extent as it passes through these two conjunct "tetrachords" of (approximately) one tone, semitone, tone each. The first tetrachord—or partial descent to the "dominant" (8765)—is heard three times, the second (5432) twice, before the ground tone (E flat) is reached.

Arranged in consecutive order, the tones of the "Arunji" corroboree—or part-corroboree—resemble those of the ancient Greek Hypophrygian, or mediaeval Mixolydian mode. c.f. Cylinder No. 25.

Box-title No. 3: Yoi-i, Bathurst Island, shrieks, &c., sticks.

(On Bathurst and Melville Islands, Yoi, means corroboree.) Referring to Spencer's spelling Colin Simpson (1951: 145) suggests that it indicates not a flat "yoy" but "yoi" with "a lively little *e* sound whipping off at the end.")

Solo monotone chanting is similar to that on Cylinder No. 1 and punctuated by group yelling, &c. The accompanying clatter is probably that of boomerangs. A unanimous yell (pitched about an octave above the chanting tone) ends the vocalizing.

Box-title: No. 4 Bathurst Island, 1912, Corroboree Conch, sticks.

This is without doubt the most colourful performance Spencer recorded. The singing rises to an unmistakable climax and the wooden trumpet or "conch" (see Accompanying Instruments) provides co-ordinate accompaniment throughout.

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[8] 1952 Olson. Musical Engineering: p. 29.

Of the eight vocal descents recorded on the cylinder, the third and fourth (Ex. 3b) offer substantially different melodic material from the first and second (Ex. 3a). The eighth, with its rhapsodic style, rise in pitch and extension of the ambit, stands apart from the rest (Ex. 3c). Before this (presumably) last descent of the cycle there is a prefixed ascent which extends the full range to an octave. There is also a second, subordinate descent commencing of bar 18 which is prefixed by (i) an ascending augmented 4th and (ii) a minor 3rd. The mode of descent resembles that of the ancient Greek Hypolydian (Mediaeval Lydian) and the heavily outlined " sharpened fourth " (bars 10-11, 12-13) contrasts with previous structural " perfect " fourths (Example 3b, bars 1-12. 18-21).

From the fifth to the seventh song-descents, the accompanying conch sounds are of short, instead of long duration and are pitched a 5th higher (not shown in Transcription). In the eighth descent the conch reverts to the first pitch and concludes the cycle with quickened staccato sounds. The accompaniment is shared with sticks and thuds (stamping?).

Box-title: No. 5 Larappi Corroboree, Nallakun tribe. Oct. 10, 1912, N.T
Sticks (no conch on), poor.

No corresponding record.

Box-title: No. 6 Nabakawulla, Bathurst Is., N.T., 1912, Conch, recitative, final shout.

The conch accompaniment in the Nabakawulla corroboree is similar in style to didjeridu accompaniments recorded north-west of Arnhem Land[9]. " Tremolo ", vibrant tones, difficult to convey in music notation, accompany each song-descent and extend beyond. With the sticks they provide connecting instrumental tissue between the end of one song-descent and the beginning of the next (Ex. 4). Spencer's " recitative " probably applies to groups of five equal tones which alternate with two of longer duration. Small ornaments decorate the vocal descents which finally become more like glissandos.

A structural interval of a 4th (bars 11-12) is linked conjunctly to one of a 5th (bars 5-6) after the manner of the ancient Greek Hypomixolydian and mediaeval Phrygian modes.

Box-title: No. 7 Wait Ba Oenpelli.
Fair.

The cylinder in this box was broken. No. 11 contains relevant material and may have been a duplicate.

9 Elkin, Sydney University Series IB; Simpson (A.B.C.) Series Side 1. Cut 2.

Box-title: No. 8 Djauan Tribe, Arunji Corroboree (shrieks), Katherine River, 1912.
Sticks good.

These "sticks" provide accompaniment in rapid beats (quavers) or in beats of double duration (quaver, quaver rest).

The ambit is an octave with an accessory tone above. The full vocal descent approximates the major mode.

Box-title: No. 9 Women's Corroboree, Katherine Creek, N.T., 1912. 1912.

The corresponding cylinder was dubbed first on the tape. See above.

Box-title: No. 10 Nuba-la-mil-la Corroboree, Kakadu Tribe, Cepelli, N.T., 1912.

In their sequence and variation the song-descents of this cylinder exhibit unusually complex structure. In the first vocal section (Ex. $5a^1$ and a^2), the ambit is a 6th. At the end of the first descent there is a rare ascent of one tone to the "ground-tone", which in this case is best termed the "finale". In the second vocal section (5b) there is an ascent beyond the ambit, the magnetic "pull" being temporarily upwards. A further coda-like section descends a 5th below the "finale" suggesting the key of A minor (5c).

Relation between vocal and stick beats is (approximately) 4 to 3. Vocal rhythm is numerical not accentual (Sachs 1953: 46). At the conclusion of the vocal descents, the stick accompaniment is effectively varied to produce a clear, isolated "ping".

Many stick accompaniments to aboriginal singing might appear to go their own way. This is not so in the Kakadu ceremony where the stick beater co-operates with the singers intelligently and effectively.

Box-title: No. 11 Boy's initiation. "Wait Ba", Oenpelli, 1912. Jamba; Fair.

(The "Jamba" is the first of five ceremonies for the Kakadu man (1928: 891). This is followed by the "Ober, Jangoan, Kilori and Muraian". "Wait Ba" is the refrain of calls by the women during the initiation ceremony.)

In the singing, the ambit is a fourth with an accessory tone above. Following the first melodic section, there is a long succession of calls, after which short-compass singing is resumed.

Tape II.

Box-title: No. 12 Warangu (*more likely Warangin*) Corroboree, Waduman Tribe, 1912.
Very fair, voices good.

(15/11/12 announced on tape.)

Melodic line is again determined by a 5th, the descent being made in short stages. Pitch of the singing is unusually high. Stick beat pattern is iambic, i.e., in triplets with the third sound omitted (c.f. Jones: 265). In the " Warangu " corroboree there are features which parallel Elkin's recordings of the Djaun Warranggan Corroboree.

Box-title: No. 13 We-ipa Corroboree, Yukal Tribe, N.T., 1912.

(8/10/12 announced on tape. But as Spencer's phonograph was not operating until 26/10/12 (see Section 2) the first figure 2, must have been missed.)

Minor 3rd is the encompassing interval. Similar short song-descents, repeated as here with upper accessory tones, are to be heard in Central Australian recordings by Davies, also by Elkin and Villeminot (Elkin 1957).

Rhythmic patterning (quaver, two crotchets, three quavers, &c.) suggests syncopation. The percussive accompaniment is probably hand and thigh clapping by women.

Box-title: No. 14 Wallugu Corroboree, Waduman Tribe 15/11/12.
Good conch.

There is no corresponding cylinder on the tape. It will be noted that the same tribe sings on No. 12, though without a " conch ".

Box-title: No. 15 Women's Corroboree (Snake), Katherine River, 1912.
Voices good.

(28/10/12 announced on tape.)

The song-descents are major in mode, passing through the full octave, then a sixth. Ambit, mode and rhythm of the singing resemble later Waranggan recordings (Elkin). For commencing vocal rhythm, see Ex. 6.

Box-title: No. 16 Nabaka Walla, Bathurst Island, 1912.
Good.

Unlike Cylinder No. 6, there is no conch accompaniment on this Bathurst Island recording. Monotone chanting ends in a descent to the 4th below and in this respect resembles samples of Melville Island chanting recorded by C. P. Mountford. But

unlike Mountford's samples Spencer's have no ascending prefix. No. 16 is a damaged cylinder. Despite surface noise percussion (stamps?) is audible.

No. 17 was not among the box-titles.
Box-title: No. 18 Arunji (Snake) Corroboree, Katherine River, 1912.
Voice, good sticks.

Again the " good sticks " sounded like a typical boomerang accompaniment. After prolonged recitation on the uppermost note, singing descends through degrees corresponding to those of the major scale. Higher descents follow and then a return to the first. In comparison with single descents, these two- and three-fold descents are innovations in melodic form. I have termed this style of singing " north-western ". (c.f. Ex. 12).

Box-title: No. 19 Djaun Tribe, Arunji Corroboree, Katherine Creek, 1912.
Sticks very good.

Singing again revolves round the octave ambit, with repetitions of the uppermost note. The regular rhythm of the sticks, in groups of three equal beats, synchronises with familiar (3/4) patterns in the vocal part (Dotted crotchet, quaver, crotchet; minim, crotchet, &c.).

Box-title: No. 20 Nabakawalla Corroboree (grave posts) Bathurst Is., 1912.
Good; single voice, yell; sticks good.

Solo monotone chanting at unusually high pitch. Other chanters follow the soloist. High-pitched (Tremolo) calls are probably executed with hand striking the lips. Percussion accompaniment by (probably) several boomerangs. For rhythmic patterning, see Ex. 7.

Box-title: No. 21 Gumbil Corroboree, Waduman Tribe, N.T., 1912.
Voice; shouts.

(15/11/12 announced on tape.)

Group chanting on two tones a minor 3rd apart. Approximate pitch E flat/3 and G flat/3. There are similarities here to Waranggan and Kunapipi two-note chanting.

Box-title: No. 22 Wijudju Corroboree, Binbinga Tribe, N.T., 1912.
Conch and sticks; good conch.

Group singing. Octave ambit with one accessory tone (Ex. 8). Also additional shorter descents, not transcribed. Regular rhythm characterizes the singing on this cylinder. The

short, staccato, " pedal " accompaniment of the conch lacks the variety of the Bathurst Island corroboree (No. 4). For stick and conch rhythm only (synchronized), see Ex. 9.

TAPE III.

Box-title: No. 23 Lurkan (mourning ceremony) Mara Tribe, N.T.
Sticks only: good.

The continuous stick beats (quavers) do not synchronize regularly with the vocal rhythm. At the conclusion of the song-descent they are heard, solo, in a short trochaic passage. (Ex. 10b.) The singing commences and ends on the same pitch, thus eliminating the " ambit " interval, which is rare (Ex. 10a.) As mentioned previously, ascents prefixed to the song descent are unusual in Australian singing. Professor Davies recorded prefixed ascents (Aranda " Wild Dog " songs), but they precede gradually by tones and semitones (i.e., conjunct) not as the Lurkan ascent which is disjunct and sounds the " broken " minor triad.

Box-title: No. 24 . . . rumung . . .[10] Tribe, Tjad-pa Corroboree, Katherine River, 1912.

The " conches " play a peculiar role in the Tjad-pa corroboree. Their plurality is unique among other recordings of single trumpets. And the effect, which is that of signalling rather than an accompaniment to the singing, is quite un-Australian by comparison.

The first " blast " approximates the pitch of E flat/5 (top space in Treble) and is not unlike a Sydney ferry siren.[11] A solo voice is then heard chanting about an octave lower. A chorus of " blasts " then follows, but in the mêlée of yells and shouts it is not easy to separate these from the rest. Unlike the orderly drone accompaniments of the Arnhem Land recordings, the effect here is unmusical.

Box-title: No. 25 Djauan Tribe, Arunji Corroboree, Katherine River N. T. 1912.
No conch on; faint (or fair?)

The vocal part descends one octave. An upper accessory note is slurred in descent. Singing is distinguished by long pauses, first on the 8th, then on the 6th (above the ground tone). Retracing of the last few notes of the descent is not an uncommon vocal feature in Australia. (Ex. 11.) In the course of the

10 Partly obliterated title.

11 But higher and more piercing than "steamboat whistle" effects in other didjeridu accompaniments mentioned by Jones (1957).

descent, a flattened seventh suggests the mediaeval Mixolydian mode. Later, the sticks strike up a trochaic rhythm with tremolo extensions and the vocal part proceeds in a similar (3/8) time.

Box-title: No. 26 Djaun Tribe, Arunji Corroboree, Katherine River 1912. Sticks good.

After the first descent (octave) voices leap to a note a major 7th above the preceding apex. (Ex. 12.) This second peak, which is not pitched unanimously, begins a new descent and classifies the singing as " northwestern " in style. (See Vocal features.) Rhythm of the percussion runs counter to that of the singing.

Box-title: No. 27 Arunji (Snake) Corroboree, Katherine River, 1912.

Conversation begins this recording.

Singing follows, similar in style to No. 26.

Three unidentified cylinders: (Xa, Xb, Xc.).

(As announced on tape, the first of these is the only black wax cylinder in the collection.)

Xa. Two sections of short-compass singing are here separated by a call more than an octave higher in pitch. (Approximately F sharp/4.) The second section is marked by a quicker rhumba-like rhythm. Singing here is comparable with that on No. 11.

Xb. A single voice, a poor native specimen, reiterates two tones with audible intakes of breath. A descent is then made through the remainder of the short compass (4th). Accompanying percussion may be stamps.

Xc. Recorded laughter and a specimen of European singing indicate that the third of these unidentified cylinders need not be taken seriously here.

FOUR LARGE 1901 CYLINDERS.

Inscribed on the cardboard boxes which housed these cylinders were handwritten titles only one of which (the first) corresponded with the recorded material.

Box-titles were:—

No. 2 Arunta Tribe
" Corroboree Song ", Charlotte Waters (2) not good.

No. 5 Arunta Song
Rainmaking song
Call of Plover (Pil-Pilpa) Charlotte Waters
Good plover call, rain song.

(On one side of this box was written " Men dancing around the performers ").

No. 6 Arunta Tribe, March 28, 1901
Women's Corrob. (2 women). Good.

No. 7 Charlotte Waters, March 30, 1901
Song relating to the tradition of the great snake of Okilcha.*

First Large Cylinder.

(Tape announcement refers to small piece of paper found glued to inside of cylinder bearing the number 2. (c.f. first box-title).

Spencer's voice is heard announcing the title: " A corroboree song of the Arunta Tribe recorded at Charlotte Waters, April 3, 1901 ". Then follows a solo male voice singing a short-phrased tune with an ambit of a 4th. The polka-like rhythm is strictly maintained and the minor 3rd rise, which occurs within the phrase, gives it melodic shape (Ex. 13).

Towards the end of the cylinder there is a decline in pitch and pace. Singing ends—or is cut off—abruptly.

Second Large Cylinder.

No Box-title corresponds to the recorded material, which may follow No. 18 in the Adelaide set. (See Section 5).

Spencer is heard saying: " Another initiatory song known as the Lallory(?) song". Monotone chanting is approximately A flat/3. Each " verse " commences with a short, decorative and descending slide. An intake of breath is audible at the end of each prolonged chant. Due to variation in speed on the original recording (referred to on tape by the audio engineer) there is a marked rise in pitch. This technical fault highlights breath intakes. A crack in the cylinder causes repetition at the end.

TAPE IV.

Third Large Cylinder.

Spencer announces: " A song relating to the tradition of the great snake man of Okilcha, recorded at Charlotte waters, March 31st, 1901.

It is possible that one of the box-titles given above (No. 7), was intended for this cylinder, although there is a slight discrepancy in the date. Dates coincide, however, in Titles No. 7 (Melbourne) and No. 23 (Adelaide). Although immediate

* Mr. T. G. H. STREHLOW, of the University of Adelaide, kindly informs me that Akiltja (phonetic spelling) is an important carpet snake totemic centre some miles east of Charlotte Waters.

comparison of sound material has yet to be made, according to rough notes made the previous year in Adelaide, monotone chanting on this third cylinder may be a duplicate of Adelaide No. 23. For rhythmic patterning (13 units) see Ex. 14.

Fourth Large Cylinder.

The sound material on the fourth and last of the large cylinders corresponds with the side inscription (plover calls) on Box No. 5. Spencer's spoken comments contain the words " men dancing around the performers " (c.f. No. 12 of Adelaide Set). There is no singing on this record. A chorus of voices call " Wha! Wha! ", a characteristic feature of Aranda ceremonies.

The cylinder concludes with ten sentences, said first in English by Spencer, then in dialect by an aborigine.

V. OTHER RECORDINGS LOCATED IN ADELAIDE

Twelve of Spencer's 1901 cylinders, which had been in the possession of the Royal Geographical Society of Australia for many years, were handed over to M. J. Barret[12] in 1955. At the present time they are in the care of the Board for Anthropological Research, University of Adelaide. With assistance from the Australian Broadcasting Commission, Mr. Barret made a tape transcription of two of the cylinders. These were successful and he later arranged for further dubbings to be made. On each occasion the cylinders were played on a large Edison phonograph at the Museum of Applied Arts and Sciences, Sydney, N.S.W.

I am indebted to Mr. G. Lawton[13] for supplying me with the following list:—

No. 1. Unintha Corroboree.
Stevenson Creek.

No. 6. Song sung by the old men at Initiatory Rite of Young men.
Stevenson Creek
22nd March, 1901.

No. 8. Song of the Chitchingalta Corroboree.
Stevenson Creek
22nd March, 1901.

No. 11. Song of the Erkita Corroboree.
Arunta Tribe
Stevenson Creek
22nd March, 1901.

12. Then President of the Anthropological Society of South Australia.

13. Reader in Geography, University of Adelaide.

No. 12. Special Exclamations used at Sacred Ceremonials, by men dancing around the performers.

No. 13. Song of the Kurnmara Corroboree.
Arunta Tribe
Charlotte Waters
28th March, 1901.

No. 17. Women quarrelling.
Two songs by women
Arunta tribe
Charlotte Waters
29th March, 1901.

No. 18. Two initiatory Songs of the Arunta Tribe.
Charlotte Waters
3rd April, 1901.

No. 19. Men quarrelling.
(*Recorded 29th March, see Section* 1.)

No. 21. Sacred Song of the Rain Totem.
Sung by two men of the Totem.
(Plover Imitations)
Charlotte Waters
30th March, 1901.

No. 23. Song relating to the tradition of
The Great Snake of Okilcha
Charlotte Waters
30th March, 1901.

(Nos. 18 and 23 were found fractured longitudinally from end to end; No. 19 was in several pieces).

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1. Aluridja man (Cent. Aust.) accompanies a song-ceremony with boomerangs (ceremonial type).

[From the Australian Aboriginal, Basedow.]

2. C. P. Mountford recording on Groote Eylandt. The singer accompanies himself with two heavy sticks.

[From National Geographic Magazine, 1949.]

3. The Australian Wooden Trumpet or Didjeridu (N. Terr.) The player's lips are within the smaller end of the hollow branch.

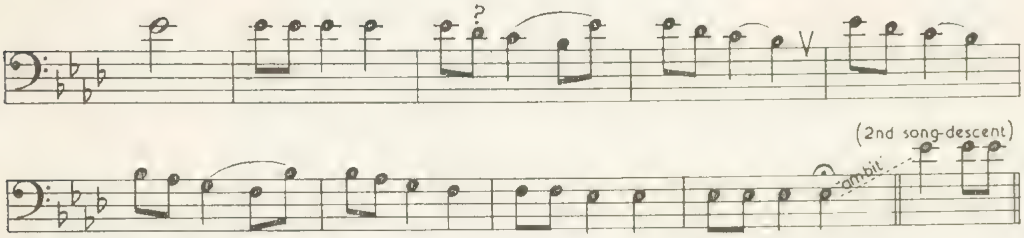
[From the Australian Aboriginal, Basedow.]

4. Scene in the Gber Ceremony, Kakadu Tribe. The man on the left is blowing the "Conch".

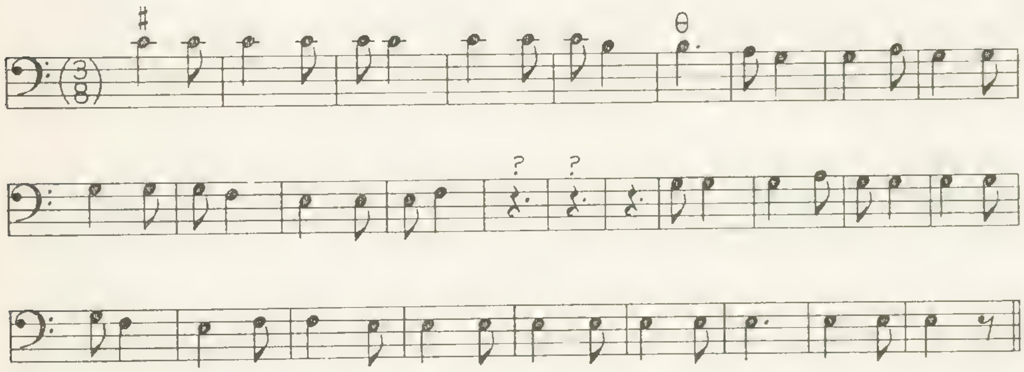
[From Wanderings in Wild Australia, Spencer.]

Ex. I. (1912 No. 9)

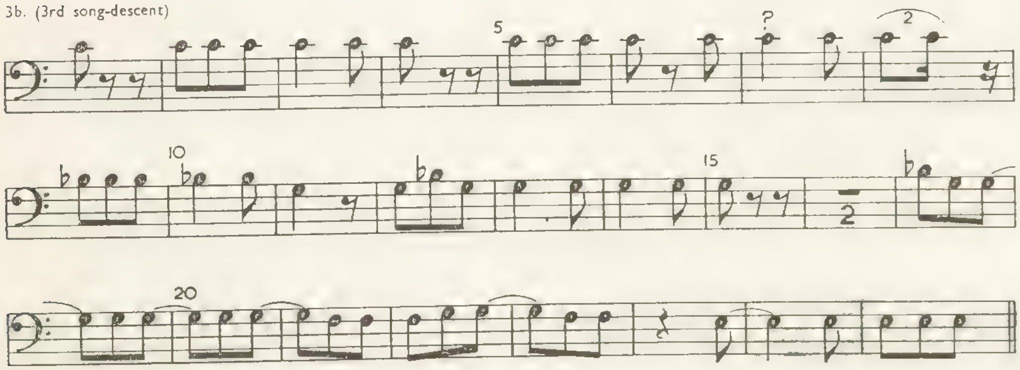
Ex. 2. (No. 2)



Ex. 3a. (No. 4)



3b. (3rd song-descent)



? — Doubt regarding accuracy of transcription

Bar-lines — Added to aid recognition of recurring time groups
(Do not imply regular accentuation)

Pitch —A/4 = 440 v.p.s. (rough checks made with violin pitch pipe)

♯ ♭ — Less than a semitone

θ — Hummed (closed mouth) effect

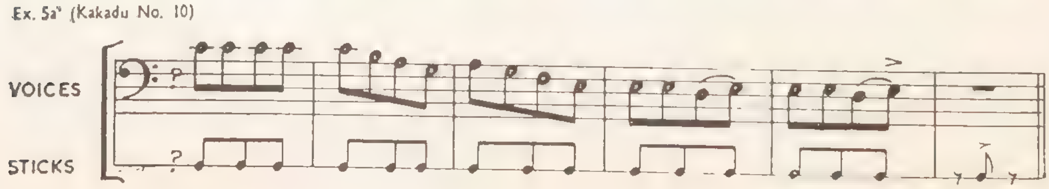
V — Breath intake

3c. (8th song-descent)

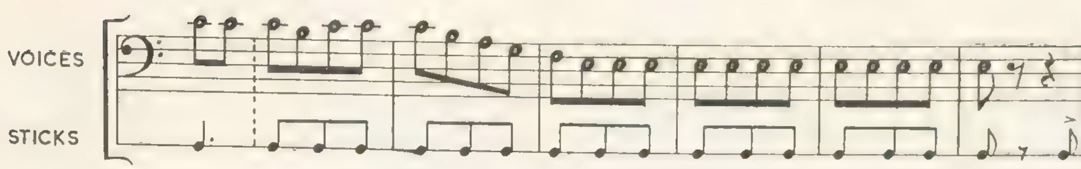
* Transcribed from 1st song-descent

Ex. 4 (1912 No 6)

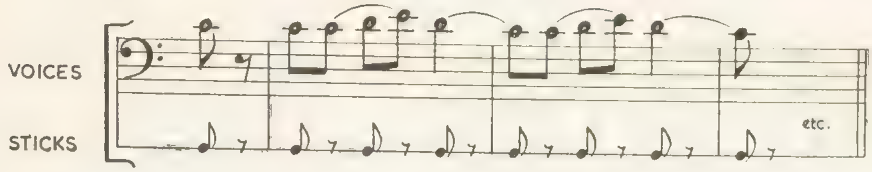
Ex. 5a* (Kakadu No. 10)



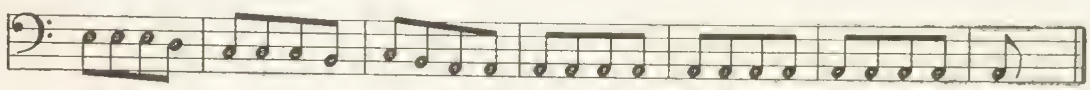
5a²



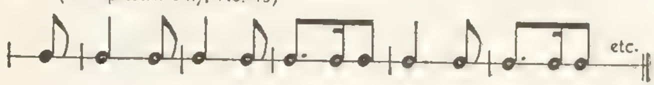
5b



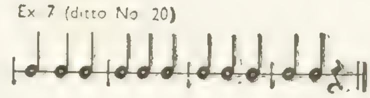
5c



Ex. 6. (Time-pattern only, No. 15)

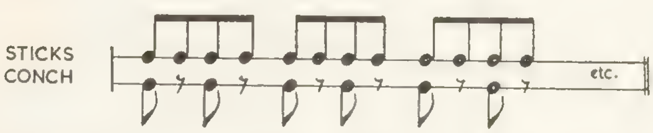


Ex 7 (ditto No 20)



Ex. 8

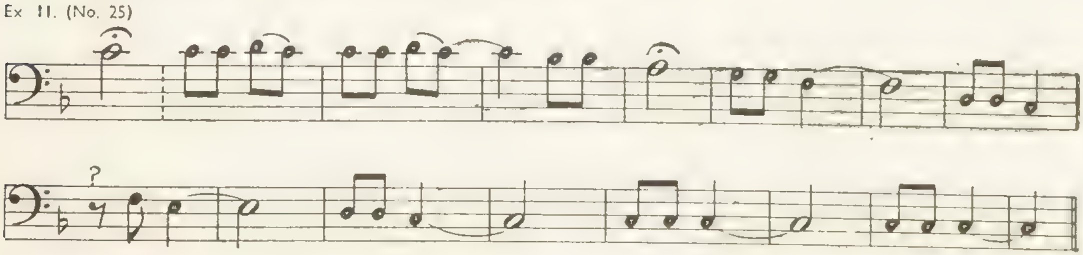
Ex. 9



Ex. 10a. (No. 23)

10b. (Solo stick-beats)

Ex 11. (No. 25)



(Later song-descents rhythmically varied) . .

Ex. 12. (No. 26)

Ex. 13. (1901 No. 1)

Ex. 14. (1901 No. 3 rhythm)

FURTHER DISCOVERIES ON VICTORIAN PLECOPTERA

By A. Neboiss, M.Sc., F.R.E.S., Assistant Curator of Insects, National Museum of Victoria.

(Manuscript received March, 1958)

Summary.

Through an intensive search in the Victorian Alps more specimens of the rare stone-flies *Thaumatoperla alpina* Burns & Neboiss, and *Thaumatoperla flaveola* Burns & Neboiss were discovered by the author. As these species were known from three females in the first, and a unique male in the second case, the opposite sexes are here designated as allotypes and described. The nymph of *T. flaveola* is also described.

DESCRIPTIONS.

Thaumatoperla alpina Burns & Neboiss.

Thaumatoperla alpina Burns & Neboiss, 1957, Mem.Nat.Mus.Vict. 21 : 93.

It was surprising that a large stone-fly like *T. alpina* had not been captured until 1954, when the first specimen, a female, was brought to the National Museum of Victoria for identification. There was a long delay in publishing the description of this rare and scientifically interesting species, and during this period two more female specimens were brought to the National Museum. The authors were thus able to include additional information in their paper and designate the newly discovered specimens as paratypes.

As the 1957 collecting season, in the early part of which these last specimens were taken, was still favourable, the author undertook field study in the Victorian Alps to obtain more detailed information of the habitat, secure some information on life history, and search for the male sex which was still unknown.

The work was limited to an area of about 15–20 square miles on the Bogong high plains, of at least 4,000 feet above the sea level. The only accessible road was that built for S.E.C. use.

Typical to the Victorian Alps, this district is characterized by steep mountain slopes, narrow gullies, and small rushing streams. The original specimen was taken above the tree line some 50 yards from the nearest water, while the others came

from near a stream in forested country. This information suggested that the most suitable locality should be near the tree line.

Every accessible stream on this altitude was therefore carefully searched, and while a number of species of caddis-flies (*Trichoptera*) and an interesting osmylid (*Neuroptera*) species were collected, no signs of the large stone-fly were found. Eventually an uninteresting looking stream on grassy slopes of Mt. Mackay at an altitude of approximately 5,500 feet yielded a pair of the beautiful stone-flies. They were disturbed by beating the vegetation along the still pools, and fell into the water, separating quickly from each other.

Further investigation of the stream gave another three female specimens which were photographed in their natural surroundings (Plate 1, Figs. 1 and 2), and secured for the collection. Unfortunately only the one male was found. It is interesting to note that all specimens except the first pair were discovered resting on the leaves of silky daisy—*Celmisia sericophylla*, an alpine plant described by J. H. Willis from the Victorian Alps in 1954. Later it was observed that the stone-flies in captivity chewed the leaves of the silky daisy; whether this is due to interrupted natural life and shock of captivity, or whether it is natural behaviour, is not certain, and observations in the natural surroundings are to be desired.

Most specimens were found resting on the upper surface of the leaves in bright sunshine. When disturbed they partially opened their wings, slightly lifting them to an angle, at the same time curling their body upwards and moving the cerci upright. None of the specimens attempted to fly, but crawled slightly deeper between the foliage of the plants. The walking movements are smooth and can be rather fast, as it was later demonstrated in the laboratory. The insects appear to be more active in the dusk or even at night.

All attempts to discover the nymphs, in spite of careful examination of a large number of stones in the rapid parts of the stream as well as from the bottom of the still pools, proved to be unsuccessful.

Description of the Male.

General appearance very similar to the female, but noticeably smaller. Measurements in mm. are given hereunder for comparison of the male with the female specimens available for study.

	♂ (allotype)	♀♀ (incl. holotype)
Prothorax—		
Width	6·5	8·0– 9·0
Length	5·0	8·0– 8·5
Anterior wing—		
Length	17·5	20·0–21·5
Width	7·0	9·5–11·0
Posterior wing—		
Length	15·0	18·0–19·0
Width	13·0	16·0
Antenna—		
Length	19·0	22·5–26·0
Cerci—		
Length	18·5	20·0–23·0

Head black, nitid, sculptured; the greyish spot on each side of the frontal suture near the base of the antennae absent (it is not quite so distinct also in the other female specimens, as it is in the holotype). Antennae black, 19 mm. long, with 57 segments. The number of antennal segments appear to be rather stable in all specimens and usually is between 52 and 57.

Prothorax slightly wider than long, but bears the same characteristic black oval central marking, and the bright orange colour of the prothorax which, in dried specimens, changes to a dull orange brown.

Abdomen cylindrical, somewhat flattened dorso-ventrally, pale yellowish grey, but the colouring is partly lost in dried specimens. On account of the softness of the body the length measurements are very variable, and often do not give the true impression of the actual size. Ventral surface yellowish grey in the first segments, further the colour gradually contracts to the posterior margin of the segment, whereas the anterior portion is black. Ninth and tenth segments black. Copulatory processes short. Creci black, 18·5 mm. long, with 32 segments.

Anterior wings anilin black, dull; costal area with numerous irregular veins. Posterior wings black, with dark blue iridescence; most of the cross-veins in the anal area are bordered with a whitish translucent border, so giving a netted appearance.

Legs black; median and posterior tibiae covered with very fine decumbent yellowish pubescence.

Material Examined.

Allotype ♂ and 4 ♀ ♀ Mt. Mackay, 5,500 feet, Vic., 23rd March, 1957, A. Neboiss; deposited in the collection of the National Museum of Victoria.

Thaumatoperla flaveola Burns & Neboiss.

Thaumatoperla flaveola Burns & Neboiss, 1957, Mem.Nat.Mus. Vict. 21 : 95.

Following the successful 1956–57 season, and the discovery of more specimens of *T. alpina*, the author concentrated the search during 1957–58 season to obtain additional information and more specimens of *T. flaveola*, up to the present known from a unique male specimen.

While visiting the type locality early in November, 1957, two small nymphs were found, and the typical form of prothorax and its sculpture clearly indicated them as being *T. flaveola*. On the second occasion, towards the end of March, 1958, final instar nymphs as well as adult specimens were found. Based on these discoveries and the nymphs collected by I. F. Edwards in January, 1958, the descriptions of nymph and adult female are given hereunder. The adult specimens were captured in late afternoon some 12–15 feet above the stream on tree fern fronds.

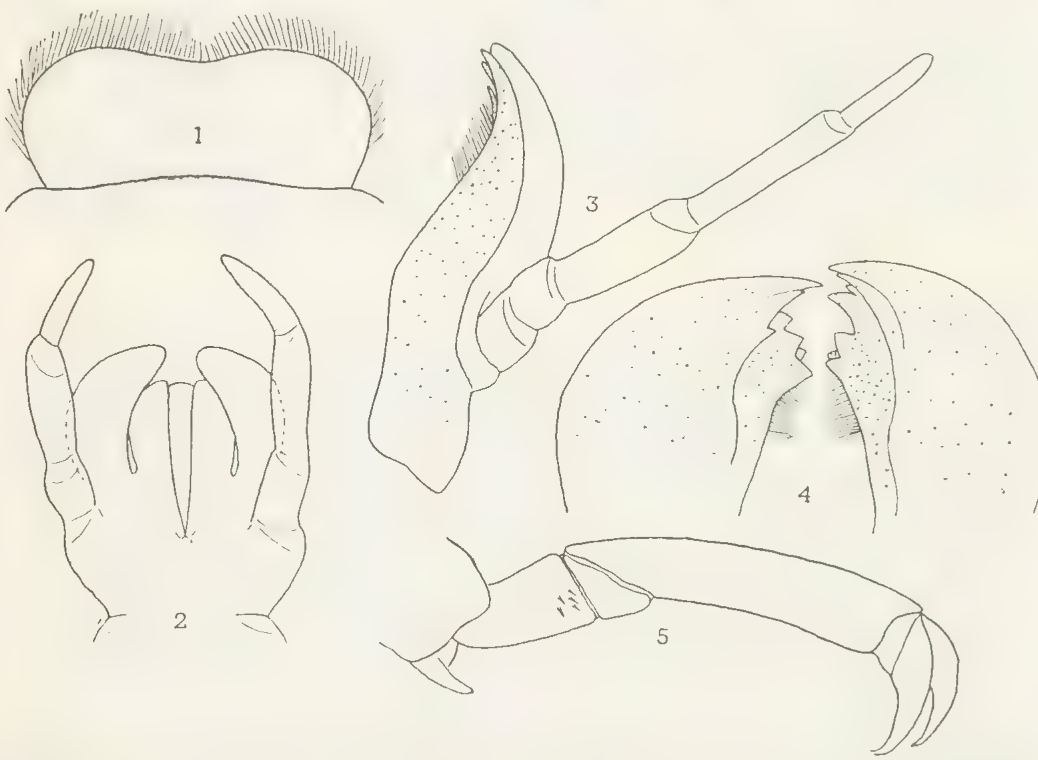
Description of the Nymph.

General colour olive, legs paler olive, cerci and antennae yellowish brown, wentral side yellowish to orange brown, about 26–30 mm. long. Body irregularly clothed with finer and stouter bristles, which are arranged in a single row along the posterior margin of each abdominal segment, more densely along the lateral line, finer and more hairlike on the ventral surface.

Head olive, as broad as pronotum, widest at the posterior end, narrowed anteriorly. A row of short, stiff bristles just behind the eyes. Antennae about 15 mm. long, filiform, tapering, first segment large, second smaller with a row of bristles covering the anterior margin, the following six or seven segments very short, inseparable, becoming progressively narrower and longer towards the apex. The number of segments exceeds 100 (in the adult specimens it is reduced to about 60). Labrum short and broad, shape as in Fig. 1. Labium, Fig. 2, with glossae shorter than paraglossae, the latter covered with rather long hairs on the

external margin. Labial palpus three segmented; first segment short, second about twice as long as first, third about 2/3 the length of second. Maxilla Fig. 3, well developed, lacinia with a pair of pointed teeth near the apex, and a row of bristles on the inner margin. Maxillary palpus five segmented, first and second segments very short, about equal in length, third slightly longer than the first and second together, fourth the longest, fifth shorter than third and about equal of the first and second together. Mandibles very strong, Fig. 4, with a number of pointed teeth at the apex, and orally of them a row of bristles on the inner margin.

Pronotum olive, with paler olive ornamentation, anterior margin brownish olive. A row of short and stiff bristles all round the margin of the pronotum except the anterior median portion where the bristles are less dense or almost absent.



FIGS. 1–5. *Thaumatoperla flaveola* B. & N. Nymphal structures. 1. Labrum. 2. Labium. 3. Maxilla. 4. Mandibles. 5. Posterior tarsus.

Legs pale olive, moderately long, femur shorter than tibia in the prothoracic legs, about equal in length in meso—and metathoracic legs. First tarsal segment short, second incomplete, shorter than first, third more than twice as long as the first and second together, touches the first dorsally; claws simple. (Fig. 5).

Abdomen somewhat cylindrical, depressed dorso-ventrally. Ninth segment the longest, tenth shorter about equal in length to the seventh. First six segments each with a pair of lateral gills in the form of somewhat knotted filaments, bluish green. Cerci yellowish brown 12—15 mm. long, with 23—28 segments. First few segments very short, the following ones becoming longer and narrower towards the apex. Each segment bears an encircling row of spines around the posterior margin.

The nymphs were found on submerged logs and stones in a small stream on Mt. Buller, Victoria (type locality) 8th November, 1957, A. Neboiss; 17th January, 1958, I. F. Edwards, and 25th March, 1958, A. Neboiss; the fully grown nymphs were collected on the two latter dates.

Description of the female.

The females of this species, similar to the other two species in this genus, are distinctly larger than the males, but the colouring in both sexes is identical. Measurements in mm. are given hereunder for comparison of the two sexes.

	♂ ♂ (incl. holotype)	♀ ♀ (incl. allotype)
Prothorax—		
Width ..	6·5– 7·0 ..	8·5– 8·8
Length ..	4·5– 4·8 ..	6·0– 6·8
Anterior wing—		
Length ..	16·0–17·0 ..	21·0–22·0
Width ..	7·0– 8·0 ..	10·0–10·5
Posterior wing—		
Length ..	16·0–16·5 ..	20·0–21·0
Width ..	13·0–14·0 ..	18·5–19·5
Antennae—		
Length ..	17·0–20·0 ..	23·0–24·0
Cerci—		
Length ..	15·0–17·0 ..	16·0–18·0

Head about as wide as the pronotum, dark yellowish brown, eyes black, a pair of pale yellowish brown oval markings on either side of the median line, the distance between the markings is about the same as between the markings and eyes. Antennae black 23–24 mm. long, with 56–64 segments.

Pronotum brownish olive, shiny, covered with very fine pubescence except for the median line and irregular pattern lines; somewhat circular sculptured depressions on either side of the median line. Legs brownish black, with the exception of meso- and metathoracic femora which are yellowish brown.

Abdomen cylindrical, somewhat flattened dorso-ventrally, olive black, not quite as shiny as in the males; ninth and tenth tergites dark yellowish olive, shiny. Subgenital plate broader than long, apical margin straight, dark yellowish olive. Sub-anal plates somewhat triangular, black. Cerci black, 16–18 mm. long, with 28–30 segments.

Anterior wings olive brown with dark grey area in the centre which reaches the posterior margin, the veins in this area are bordered with olive brown, so that each cellule is dark, surrounded by an olive brown line. Posterior wings dark grey, costal margin and apex, as far as the cubital veins, olive brown. Cross veins in the anal area bordered with whitish translucent line.

Material Examined.

Allotype ♀; 1♀ and 3♂♂ White falls, Mt. Buller, Vic., 25th March, 1958, A. Neboiss; deposited in the collection of the National Museum of Victoria.

Acknowledgments.

Much valuable data for this work was supplied by Mr. McComb, of Melbourne University; great assistance was also given by the staff of the State Electricity Commission of Victoria (S.E.C.) both at Melbourne and Mt. Beauty, and by Mr. I. F. Edwards, of Geelong Grammar School, Timbertop, near Mansfield. To all of them the author expresses the most sincere thanks.

EXPLANATION OF PLATES.

(Photographs by the Author.)

FIG. 1. General view of the locality near Mt. Mackay. Clumps of silky daisy are on the edge of the stream.

FIG. 2. Close view of a clump of silky daisy with a specimen of *Thaumatoperla alpina* B. & N. on a leaf.

TERTIARY FOSSIL FERN FROM VICTORIA, AUSTRALIA.

By Edmund D. Gill, Curator of Fossils, National Museum of Victoria, and Kathleen M. McWhae (née Pike), Western Australia.

ABSTRACT.

The type specimen of the early Tertiary fern *Cyclosorus Dargoensis* (McCoy) new comb. is re-figured, and new information provided. A palynological examination of the matrix has been made.

INTRODUCTION.

When Tertiary type fossils in the National Museum of Victoria were being checked, it was noted that a fossil fern named *Lastraea Dargoensis* by McCoy (1878) from the deep leads of the Bogong High Plains was in need of adequate illustration. Plate 1 re-figures the specimen, and the new combination *Cyclosorus Dargoensis* is proposed.

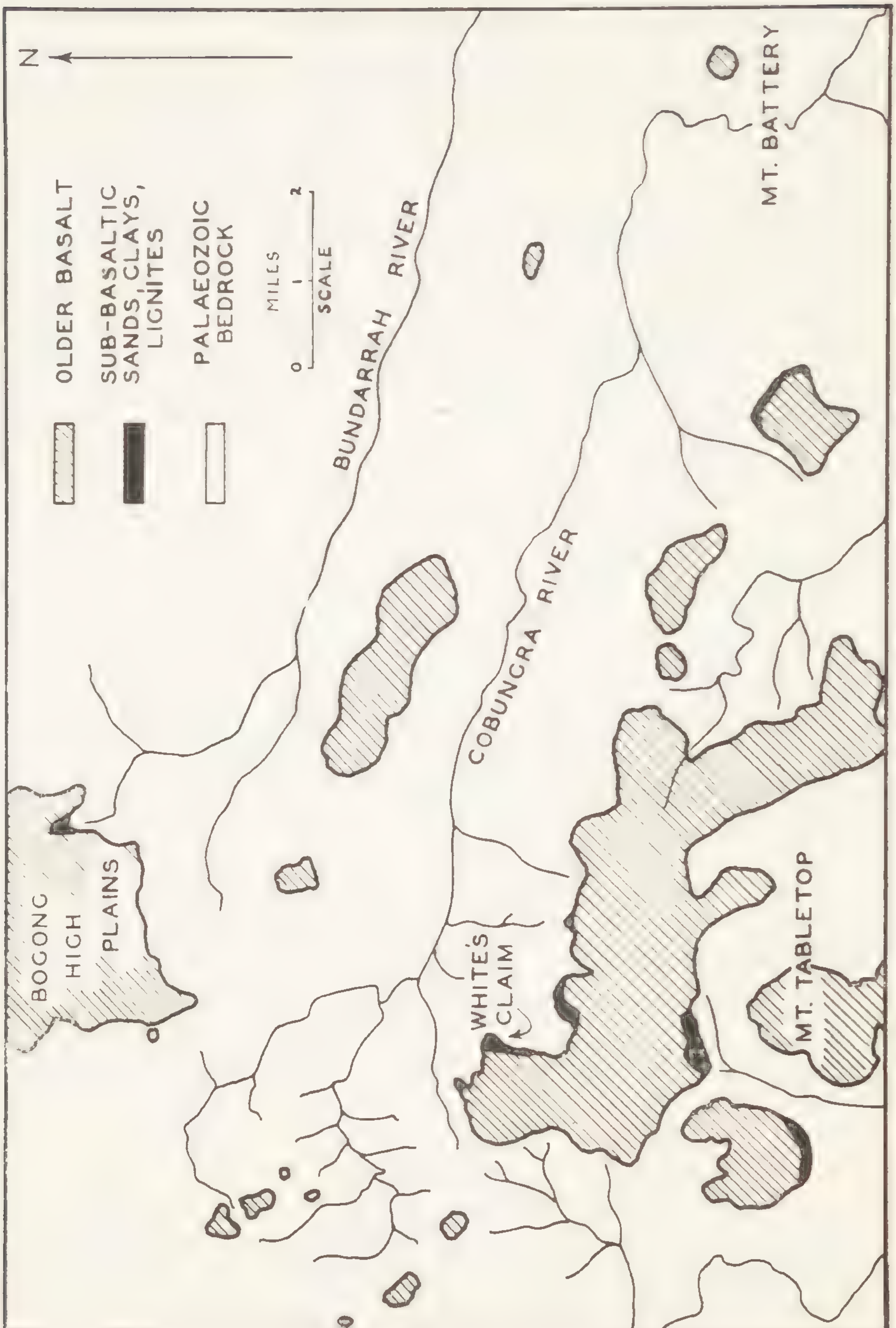
PROVENANCE.

Professor (later Sir) Frederick McCoy in 1878 published determinations of fossil plants obtained from fluviatile and lacustrine deposits under the Older Basalt of the Bogong High Plains. These fossils came from White's goldmining claim on Cobungra Creek at the headwaters of the Bundarrah River (Couchman 1878), over 5,000 feet above present sea-level. Hunter (1909) and Kenny (1937*a*, *b*) have given information on the geology. Brough Smyth (1876) illustrated some of the fossils, while Royce (1887) and Tadgell (1926) have given general information on the area. The geographical position of the site is shown in Figure 1.

From these plant beds McCoy determined " a *Lastraea, L. Dargoensis* (McCoy), allied to a Miocene species from Arctic regions." He thus gave a new specific name, but did not validate it with description or figure. The specimen is in the National Museum of Victoria (P16156), and consists of a brown (oxidized) micaceous siltstone with the fossil plants preserved as carbonaceous films (Plate 1). Hall and Pritchard (1894) refer to this occurrence.

TAXONOMY.

In 1929 Chapman included in his " Open Air Studies in Australia " a photograph (Fig. 60) of the type specimen of *Lastraea Dargoensis*, but it was so diminutive as to be inadequate as a figure. Thus Dr. Duigan (1951) listed it in her " Australian Tertiary Flora " as a " species *Incertae sedis* ".


N
OLDER BASALT
SUB-BASALTIC SANDS, CLAYS, LIGNITES
PALAEOZOIC BEDROCK
MILES
0 1 2
SCALE
BUNDARRAH RIVER
COBUNGRA RIVER
MT. BATTERY
BOGONG HIGH PLAINS
WHITE'S CLAIM
MT. TABLETOP

A photograph of the type specimen was sent to Miss Mary D. Tindale of the Botanic Gardens, Sydney, for examination. Mr. R. H. Anderson, the Chief Botanist, has kindly allowed us to use Miss Tindale's findings, which are as follows. "I do not think there is any doubt that it is a species of *Cyclosorus*, a genus of about 300 modern species belonging to the Family Aspidiaceae (if you follow Copeland in his 'Genera Filicum' (1947) 141 or Family Polypodiaceae sub-family Dryopteridoideae according to Christensen in the 'Manual of Pteridology'). *Cyclosorus* and *Lastraea* (or *Thelypteris* as it should now be known) both belong to *Dryopteris sens. lat.* The genus *Cyclosorus* is characterized by pairs of veins united to each excurrent vein between the lobes of the primary pinnae. This type of venation is clearly shown in the photograph. In *Thelypteris* (syn. *Lastraea*) the veins do not join the sinus. Your fossil fern is very similar to *Cyclosorus pennigerus* (Forst.) Copel. which is found in Victoria to-day."

A specimen of *Cyclosorus pennigerus* was kindly forwarded to us from the Botanic Gardens, Sydney, and this is figured in Plate 2, while the enlargement in Plate 1, fig. 2, of McCoy's specimen shows the similarities between the extinct *Cyclosorus Dargoensis* and the extant *Cyclosorus pennigerus*.

DESCRIPTION OF *CYCLOSORUS DARGOENSIS* (McCoy) Gill and McWhae.

Synonym: *Lastraea Dargoensis* McCoy 1878. *Rept. Prog. Geol. Surv. Vict.* pp. 174–176.

Type Specimen: Nat. Mus. Vict. p. 16156. Plate 1, Figs. 1–2. The specimen consists of part of a leaf with pinnae of the order of 4 cm. long carrying about 30 lobes measuring about 5 mm. by 3 mm. Ten lobes occupy approximately 3 cm. on one side of the pinna. Pairs of veins are united to each excurrent vein between the lobes of the pinnae.

Palynological Examination.

One of us (K. M. McW.) made preparations from a piece of matrix of the type specimen. As the material was oxidized, the pollen and spore content was low. Numerous monolete spores were obtained and found to agree in size and shape with those of *Cyclosorus* as described by Harris (1955). The spores are free, and anisopolar, bilateral, monolete, laesura long, elliptical in polar view, exine thin (1μ), perine absent, and have equatorial diameters ranging from 30-47μ. As the perispore has been lost from these fossils, either through preservation or preparation, a definite connexion with *Cyclosorus* cannot be established. However, the great abundance of monolete spores in the preparations suggest that the spores are probably derived from the fern whose remains are so common in this rock. The living genus, *Cyclosorus,* with which the fossil fern has been compared, possesses monolete spores covered by variously ornamented perispores. It is realised that there are spores of other fern genera which without the thin perispore could look like the fossil

spores just described. The palynological evidence is in keeping with the macroscopic identification but cannot demonstrate absolute relationship.

The following sporomorphs were also found with the spores:

Coniferae	*Dacrydiumites Florinii* Cookson & Pike.
	D.Mawsonii (Cookson) Cookson.
	Microcachrydites antarcticus Cookson.
Fagaceae	*Nothofagus* species *c,e* Cookson.
Incertae Sedis	*Triorites harrisii* Couper.

All the above species are found in beds of similar type and stratigraphical position at Vegetable Creek and in the Snowy Mountains (Gill and Sharp 1957), N.S.W.

Geological Age.

The Bogong and Dargo High Plains of Victoria extend into New South Wales where in the Snowy Mountains area there are similar deposits of carbonaceous, lacustrine sediments preserved under Older Basalt. These are Lower Tertiary in age, and may be Upper Eocene (Gill and Sharp 1957). It is therefore probable that the deposits at Cobungra Creek containing *Cyclosorus Dargoensis* are of the same geological age.

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EXPLANATION OF PLATES.

PLATE 1.

FIG. 1. Holotype of *Cyclosorus Dargoensis* (McCoy) Gill and McWhae, X2. ?Eocene.

FIG. 2. *Do.*, in part, X4. Note venation between third and fourth of lower series of primary pinnae.

PLATE 2.

FIG. 1. *Cyclosorus pennigerus* (Forst.) Copel., living. Specimen from Botanic Gardens, Sydney, greatly enlarged to show characteristic venation.

FIG. 2. *Do.* lower surface, slightly enlarged.

FIG. 3. *Do.* upper surface, slightly enlarged.

PLATE 1.

PLATE 2.

NEW GASTEROPODS FROM NORTH AUSTRALIA

By J. Hope Macpherson,

Curator of Molluscs, National Museum of Victoria.

Large numbers of molluscs from collectors all over Australia are submitted to the National Museum for identification; among them are rare shells and, occasionally, undescribed species.

The specimens dealt with below were acquired in this manner and I should like to thank their donors for the generosity which has enabled me to record them and add them to the National Museum collections for use by future workers.

Family MURICIDAE

Murex (Murex) espinosus sp. n.

Plate. Figs. 1, 1A.

Shell of medium size (approximately 60 mm. long) solid, naked except for one or two fine short spines on the posterior end of the canal; whorls seven and a half, strongly convex, three varices on the body whorl; sculpture of spiral cords (8 on body whorl of type) and two or three axial ribs between the varices. The spiral cords tend to fade in the interspaces and strengthen on the axial ribs and varices giving them a nodulose appearance. Colour rose-orange with the rugosities lighter in tone; aperture oval, white; columella callus adhering above but free, thin, and extended below. Outer lip slightly produced and finely crenulate. Siphonal canal of medium length, shorter than the height of the whorls, slightly tapering and with one or two, fine, short spines aligned with the varices around its base. Nuclear whorls one and a half, smooth, rounded, deep rose; the following whorls sculptured with regular, fine, spiral cords and axial ribs; but as the whorls increase the sculpture becomes less regular. The smaller paratype shows traces of a thin, horn coloured periostracum. Operculum deep rose coloured, unguiculate, suboval and strongly sculptured with concentric ridges.

Measurements of type. 60 mm. long, 27 mm. wide.

Specimens examined. Holotype National Museum of Victoria No. F 17960. 2 Paratypes No. F 17960A, locality Tweed Head, New South Wales, dredged in 30 fathoms, presented by Mr. T. Garrard; 1 Paratype in collection of Mrs. N. Jackson, Sydney (measurements 72 mm. long, 37 mm. wide); radula in collection

of National Museum No. F 18865. In collection of Mrs. J. A. Grigg, 3 adults and 1 juvenile trawled Hervey Bay, Queensland; 3 dead shell with hermit crabs taken in fish traps at 60 fathoms off Wooli, Northern New South Wales; 1 specimen trawled in 10 fathoms, Morton Bay, on muddy bottom.

This shell is quite distinct from any other Australian species but shows some affinities with *Murex marcoensis* Sowerby from Florida; it differs in the lack of spines on the varices, and its much finer and less well defined spiral cords.

Family MELONGENIDAE

Pugilina griggiana sp. n.

Plate. Figs. 2, 2A, 2B.

Shell solid, bluntly spindle shaped, whorls 7 or 8, the anal groove forming a keel with above it a flat or slightly convex shoulder extending to the impressed suture. Uneroded shell covered with a thick dull brown periostracum bearing encircling rows of short stiff hairs which are longer on the keel and shoulder. Removal of the periostracum reveals the smooth red-brown shining shell surface sculptured with numerous, fine encircling cords (approximately 40 on the body whorl). Aperture narrow, deep flesh coloured, subquadrate and lengthened into a broad siphonal canal. Outer lip, deep red-brown in colour, thin and crenulated by the encircling cords. Inner lip covered with a thin cream glaze; columella heavy and twisted to usually obscure the umbilical chink. The first two or three adult whorls are faintly axially costate but the remaining whorls are without axial sculpture except for fine growth lines. Operculum unguiculate with an apical nucleus and fine, axial growth lines.

Measurements of type. 102 mm. long, 50 mm. wide.

Specimens examined. Holotype National Museum No. F 17571, 6 Paratypes F 17571A. Locality 10 miles upstream from the mouth of the Port Keats River, Northern Territory, collected by Mrs. E. B. Grigg. Mrs. Grigg collected 40 living specimens among mangroves in solid mud. She also collected a number of *Volegalea wardiana* Iredale, 1938, at two localities, Mindil Beach, near Darwin, living in sand and rock, and at Wallaby Island, north of the Port Keats River, living buried in mud among the mangroves. *V. wardiana* differs from the present species in having strong axial costae on all whorls (particularly on the body whorl) and its encircling cords become obsolete towards the shoulder. The periostracum lacks the encircling lines of hairs

except for two or three rings close to the suture. One of Tryon's figures of *Melongena cochlidium* (Manual Conch. III., plate 43, fig. 227) appears to represent *griggiana.*

The Melongenidae are noted for variation of the axial sculpture within a species. However, because of the distinctive periostracum, a lack of any sign of gradation between *wardiana* and the present species, and in view of the quite distinct habitats of the two, it seems reasonable to consider them as separate species. I have placed this shell in the genus *Pugilina* Schumacher as I cannot see any valid reason for its generic separation from *P. morio* Linne, the type of *Pugilina.* I would also include *V. wardiana* Iredale, thus reducing *Volegalea* to the synonomy of *Pugilina.*

Family FASCIOLARIIDAE

Peristernia aethiops sp. n.

Plate. Fig. 3.

Spindle-shaped, spire approximately same length as mouth; sculptured with strong close-set encircling cords and axial costae (10 on body-whorl); colour red-brown with some cords all white or white on the apex of each costa; mouth mauve, outer lip thin, finely crenulate, interior showing impressions of the costae, inner lip smooth and two faint plaits at the base of the columella which is twisted and reflected to almost close the umbilicus in the type. Anterior canal short, reflected.

Measurements of type. 30 mm. long, 15 mm. wide.

Specimens examined. Holotype National Museum No. F 18466, Paratype in the collection of Mrs. E. B. Grigg, Locality Portland Roads, North Queensland, collected by Mrs. Grigg.

Family OLIVIDAE

Alocospira rosea sp. n.

Plate. Fig. 4.

Shell acuminate, elongate, fusiform, whorls seven including two nuclear; mouth slightly longer than the spire; colour light pink fading to white at the base of the body whorl, sutural band and columella callosity flesh coloured; spire ornamented with five, distinct, encircling cords which commenced above the outer lip; aperture elongate, ovate; outer lip thin; columella twisted; operculum large, thin, horn-coloured.

Measurements of type. 14 mm. long, 9 mm. wide.

Specimens examined. Holotype National Museum No. F 18467; 3 Paratypes No. F 18468; 5 specimens in collection of Mrs. E. B. Grigg. Locality Green Island, Cairns, Queensland, living in weedy sand around low tide mark, seldom taken in the daytime.

Family CONIDAE

Conus rufimaculosus sp. n.

Plate. Figs. 5, 5A, 5B, 5C.

Shell approximately 35 mm. long, light, smooth, strong, conical. Colour white with irregular red-brown splashes which in the type specimens are irregularly tent-like. Periostracum very fine straw-coloured, showing the pattern beneath. Outer lip thin, translucent showing the external colouring; aperture rose pink within, narrow, widening a little towards the anterior. Whorls 8 to 10, the outer edge sharply raised to form a narrow vertical ridge. Spire slightly elevated, canaliculated, the canal forming a notch at the posterior end of the aperture, apex raised and pointed. Sculpture appears to consist only of spiral incised lines on the anterior third of the shell but under the glass a faint tracery of encircling lines and longitudinal growth lines becomes visible. The operculum of the holotype had been lost but it was retained in a specimen lent for comparison by Mrs. N. Jackson and this has been figured. It is thin, horny unguiculate with a bulb-like process on the inner side close to the rounded anterior margin.

Measurements of type. 34 mm. long, 18·4 mm. wide.

Specimens examined. Holotype National Museum No. F 18465; presented by Mr. L. Black; 2 Paratypes No. F 18188, presented by Mr. T. Garrard. Locality Tweed Head, New South Wales, dredged at night in 15–30 fathoms.

In the last few months the National Museum has received for identification from several collectors seven specimens of this shell from the above locality. In addition I have seen three specimens from the collection of Mrs. E. B. Grigg, trawled at 10 fathoms off Jumpin Pin, southern end of Morton Bay, Queensland.

This species corresponds quite well to the description of *Dendroconus* Swainson, 1840, but as a satisfactory subdivision of *Conus* as a group has not yet been carried out, it is better not to adhere to divisions which in many cases are unnatural. Therefore *Conus* sensu lato has been used for this species.

Family VASIDAE

Tudicula rasilistoma Abbott*

Plate. Figs. 6, 6A, 6B, 6C.

Shell solid, heavy, fusiform; whorls 7 to 8 including the protoconch of 1½ smooth rounded whorls, nodulosely keeled, and bearing 7 to 8 rounded axial ribs; spire moderately produced, pyrimidal; sutures indistinct, wavy; aperture oval continuous with the narrow siphonal canal, shining smooth, lips pink splatched with brown, interior white. Columella callus well-developed, bearing three spiral plaits below the curve, the central plication being the strongest. Outer lip strong, smooth. Umbilicus shallow, funnel-shaped. Mouth and siphonal canal more than half length of shell. The shell is ornamented with numerous very fine encircling lirae which are crossed at irregular intervals by lines of growth giving the shell a wrinkled appearance. Periostracum grey-brown, felt-like, and persistent; eroded shells are red-brown with two narrow white bands on the keel and one on the canal.

Measurements. Holotype 72 mm. long, 39 mm. wide; Paratype 58 mm. long, 32 mm. wide.

Specimens examined. Holotype National Museum No. F 18189, Paratype No. F 18189A, locality Tweed Head, New South Wales, dredged in 30 fathoms; 2 Paratypes No. F 18761, Tin Can Bay, Queensland (30 fathoms); all presented by Mr. T. Garrard; 2 Paratypes, off Brisbane, Queensland, presented by Mr. L. Black (one National Museum No. F 19866, one sent in exchange to Academy Natural Sciences of Philadelphia, Catalog number A.N.S.P. #227669). A water-worn specimen from Caloundra, Queensland, is in the collection of Mrs. L. Brown.

NEW NAME FOR *MYODORA GABRIELI* MACP.

J. Hope Macpherson.

Myodora gabrieli Macp. was described in Memoirs National Museum Victoria 17, 1951, p. 81, but the name is preoccupied by a fossil *Myodora gabrieli* Chapman and Crespin, 1928, so I propose that it should be replaced by *Myodora latilirata*.

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* Since writing the above description, M.S. of which was supplied to Tucker Abbott, Part I. of Indo Pacific Mollusca has been published containing the description, and by priority the authorship of the species must be attributed to him. The TYPE remains in the National Museum of Victoria.


1
1A
3
4
2A
2
2B
5
5A
5B
5C
6
6A
6B
6C

PLATE.

1. *Murex* (*Murex*) *espinosus* sp. n., holotype F 17960, x1.

1A. Radula (F 18865) of Paratype in collection of Mrs. N. Jackson.

2. *Pugilina griggiana* sp. n., holotype F 17571, x$\frac{3}{4}$.

2A. Epidermis on left side of body whole of small Paratype F 17571A.

2B. Epidermis on posterior margin of mouth of same shell.

3. *Peristernia aethiops* sp. n., holotype F 18466, x1$\frac{1}{2}$.

4. *Alocospira rosea* sp. n., holotype F 18467, x2.

5. *Conus rufimaculosus* sp. n., holotype F 18465, x1$\frac{1}{2}$.

5A. Spire of holotype.

5B. Operculum of shell in collection of Mrs. N. Jackson.

5C. Bulb of operculum x4$\frac{1}{2}$.

6. *Tudicula rasilistoma* sp. n., holotype F 18189, x$\frac{3}{4}$.

6A. Operculum of paratype F 18189A enlarged to proportions of type.

6B. Paratype F 18761A.

6C. Protoconch of F 18761A enlarged.

BRENTHIDAE OF THE AUSTRALIAN REGION, I.

By Karl E. Schedl, Lienz, Austria.

The National Museum of Victoria, through the Curator of Insects, Mr. A. N. Burns, has sent to me a large number of *Brenthidae* originating from Australia, the Solomon Islands, New Guinea, and Tasmania. The larger part of the material belongs to the National Museum of Victoria, 34 specimens to the collection of Mr. A. N. Burns, and 17 specimens to Mr. F. E. Wilson.

During the determination I also had the opportunity to go over the collection of the Naturhistorisches Museum at Vienna, finding there some very interesting species. A few specimens were compared with the material in the British Museum by the kindness of Mr. E. B. Britton, other specimens from the British Museum and the Deutsche Entomologische Museum in Berlin were checked by myself.

The larger part of the collection could be named; nine specimens remain for future study. For the known species the locality records are given below; the description of a new species is added.

New Records of known Species.

Calodromini

Cyphagogus delicatus Lea

Gosford, N.S.W. IX.03, H.J.C., I sp. (Nat.Mus.Vic.)
Tasmania, without exact locality, 2 sp. (Nat.Mus.Vic.)
Kokoda, Papua, 1200 ft., VII.1933, L. E. Cheeseman. (Brit. Mus.)

Cyphagogus diorymerus Lea

Dorrigo, N.S.W., 2 sp. (Nat.Mus.Vic.)
Gosford, N.S.W., Carter, 2 sp. (Nat.Mus.Vic.)

Cyphagogus suspendiosus Lea

Australia, without exact locality, 3 sp. (Nat.Mus.Vic.)

Stratiopisthius doriae Senna

Coen district, Cape York, Qld., H. Hacker, 2 sp. (Nat.Mus. Vic.)
Kokoda, Papua, 1300 ft., IX.1933, L. E. Cheesman. (Brit. Mus.)

Stereodermini

Jonthocerus opthalmicus Pascoe

Mt. Tamborine, Qld., A. M. Lea, 1 sp. (Nat.Mus.Vic.)

Sydney, N.S.W., Carter, trapped by Pisonia seed vessel, 1 sp. (Nat.Mus.Vic.)

Bunya Mts., Qld., Carter, 1 sp. (Nat.Mus.Vic.)

Cerobates australasiae Fairmaire

N.S.Wales, without exact locality, 9 sp. (Nat.Mus.Vic.)

Trachelizini

Microtrachelizus (Trachelizus) *howitti* Pascoe

Portland, Vic. (Nat.Mus.Vic.)

Morang, Vic. (Nat.Mus.Vic.)

Otford, N.S.W. (Nat.Mus.Vic.)

Ballarat district, Vic., 34 sp. (Nat.Mus.Vic.)

Trachyzelus bisulcatus Fabricius

Cairns, Qld., 7 sp. (Nat.Mus.Vic.)

Coen district, Cape York, Qld., H. Hacker, 2 sp. (Nat.Mus. Vic.)

Amorphocephalini

Cordus ganglbaueri Senna

Typus, without exact locality, Australia, in Naturh. Museum Wien.

Lucindale, S.A., F. Secker, 2 ♀♀ (Nat.Mus.Vic.)

S. Aust., with following label: *Cordus hospes* Col., by A. M. Lea 1904, see Proc.roy.Soc.Vict., 1905 : 341, in nest of ant "*Iridomyrmex nitidus*," pres. Dec. 1904. 2 ♂♂ 1 ♀ (Nat.Mus.Vic.)

Ocean Grove, Vic., H. W. Davey, 1 ♀ (Nat.Mus.Vic.)

Lake Hattah, Vic., 16.IV.1919, J. Dixon, 1 ♀ (Nat.Mus.Vic.)

Tallangatta, Vic., 23.III.1913, 1 ♂ (Nat.Mus.Vic.)

Warburton Ra. W.A., II.XI.1949, F. H. Uther Baker, 1 ♂ (Nat.Mus.Vic.)

Cordus hospes Germar

Killara, Vic., 20.XII.1903, 2 ♂♂ 1 ♀ (Nat.Mus.Vic.)

Mackay, Qld., III.1899, 1 ♂ (Nat.Mus.Vic.)

Warrandyte, Vic., 1 ♂ (Nat.Mus.Vic.)

Jeeralang, Vic., 15.XII.1948, A. L. Brown, 1 ♂ (Nat.Mus. Vic.)

Halls Gap, Vic., 8.XI.1945, A.B. 1 ♂ (Nat.Mus.Vic.)

Hurstville, N.S.W., VI.1953, 3 ♂♂ (Nat.Mus.Vic.)

Wandong?, Vic., 2867, 7.XI.1905, 3 ♂♂ (Nat.Mus.Vic.)

Warburton, Vic., 16.III.1919, 1 ♂ (Nat.Mus.Vic.)

Australia, Fisch, 1880, McCoy. (Nat.Mus.Vic.)
Mt. Lofty Ra. S.A., Bernard Gall, 1♀ (Nat.Mus.Vic.)
S. Aust., without exact locality, 2♂♂ 6♀♀ (Nat.Mus.Vic.)

Cordus schoenherri Power

Australia, Fisch, (Naturh.Mus.Wien.)
Australia, McCoy, (Naturh.Mus.Wien.)
Western Port, Vic., 3 sp. (Nat.Mus.Vic.)
Mt. Lofty Ra. S.A., Bernard Gall, 1 sp. (Nat.Mus.Vic.)

Kleineella australis Lacordaire

Caboolture, Qld., X.1920, 1♂, F. E. Wilson coll.
Flora R., N. Terr., from Prof. Spencer, collected 7–8/1912, 1♂ (Nat.Mus.Vic.)

Kleineella sulcicollis Pascoe

Damitz, Qld., C. Barrett, 1♀, F. E. Wilson coll.
Flinders Ra., S. Aust., W. K. Graman, 20.X.1897, X. Zinta, 1♀ (Nat.Mus.Vic.)
Flora R., N. Terr., Prof Spencer, 7.VIII.1912, 1♂ 1♀ (Nat.Mus.Vic.)

Arrhenodini

Baryrrhynchus schroederi Kleine

One specimen of this species in the Naturhistorisches Museum Wien originating from "Neu Pommern, Gazellen Halbinsel, Rechinger" determined by Kleine exactly corresponds with the not quite mature male Paratype of *Eupsalis pictipennis* Lea of the National Museum of Victoria, bearing the label "out of log", Claudie R., 12.XI.1913. *Eupsalis pictipennis* has been overlooked in the last edition of the Catalogus Coleopterorum and in the Genera Insectorum by Kleine although the description has been published in the Trans. roy. Soc. S. Aust. 15, 1916 : 367. As we can admit that the determination by Kleine is correct, *Eupsalis pictipennis* Lea (1916) becomes synonymous with *Baryrrhynchus schroederi* Kleine (1914).

Caenorychodes digramma Boisduval

Endeavour R., Qld., 12♂♂ 6♀♀ (Nat.Mus.Vic.)
Cairns, Qld., 1♂ (Nat.Mus.Vic.)
Queensland, without exact locality, 2♂♂ 3♀♀ (Nat.Mus.Vic.)
Cooktown, Qld., C. Olive, 1♂ (Nat.Mus.Vic.)
Innisfail (Geraldton), Qld., 1♂ (Nat.Mus.Vic.)

Australia, Müller, 94 (Naturh.Mus.Wien.)
Melbourne, Vic., French, 1890. (Naturh.Mus.Wien.)
Andai, Neu Guinea, 1875, coll. Bruijn. (Naturh.Mus.Wien.)

Caenorychodes maasi Kleine

Torokina, Sol. Is., 22.X.1945, R. Clarke, 1 sp. (Burns coll.)

Eupsalis promissa Pascoe

Endeavour R. Qld., S. Lama, 1♀ (Nat.Mus.Vic.)
Cairns, Qld., E. Allen, 1♀ (Nat.Mus.Vic.)
Torres St. N. Aust., 1♂ (Nat.Mus.Vic.)
Cooktown, Qld., Coline, 19.V.1915, 1♀ (Nat.Mus.Vic.)
King R. N., Terr., 6.1.1916, 6♂♂ 12♀♀ (Nat.Mus.Vic.)
Australia, Müller, 1894. (Naturh.Mus.Wien.)
Australia, Stevens, 1860. (Naturh.Mus.Wien.)
Somerset, N. Qld., 1.1875, L. M. D'Albertis. (Naturh.Mus. Wien.)
Isola Yule, Neu Guinea, IV.1875, L. M. D'Albertis. (Naturh. Mus.Wien.)

Belopherini

Ectocemus decemmaculatus Montrouzier

Cairns, Qld., Brown, 1♂ 2♀♀ (Nat.Mus.Vic.)
Queensland, without exact locality, 5♂♂ (Nat.Mus.Vic.)
Endeavour R. Qld., 3♂♂ 3♀♀ (Nat.Mus.Vic.)
Claudie R. Qld., out of old log, 3♂♂ 3♀♀ 12.XI.1913, (Nat. Mus.Vic.)
Torokina, Sol. Is., 23.X., 18.XII.1945, 8♂♂ 5♀♀ (A. N. Burns coll.)
Somerset, Qld., I.1875, L. M. D'Albertis. (Naturh.Mus. Wien.)
New Pommern, Gazellen Halbinsel, Rechinger. (Naturh.Mus. Wien.)
Wokan, Isola Aru, O. Beccari 1873. (Naturh.Mus.Wien.)
? Thorey, 1867. (Naturh.Mus.Wien.)
Ramoi Ging, 79, Nuova Guinea, L. M. D'Albertis. (Naturh. Mus.Wien.)
New Guinea, coll. Plason. (Naturh.Mus.Wien.)
Salvatti, New Guinea, 1875, coll. Bruijn. (Naturh.Mus. Wien.)

Elytracantha poyonocerus Montrouzier

Torokina, Sol. Is., 18.XII.1945, R. Clarke, 2 sp.
Kainanti, N. Guinea, E. W. Wave, 2 sp. (F. E. Wilson Coll.)

Ithystenini

Diurus forficuloides n. sp.

Torokina, Sol. Is., 15.XI. and 18.XII.1945, R. Clarke, 2♀♀ (F. E. Wilson coll.)

Ithystenus curvidens Montrouzier

Kataw, Nuova Guinea, X.1876, L. M. D'Albertis. (Naturh. Mus.Wien.)

Halmahera, Molucche, 1875, coll. Bruijn. (Naturh.Mus. Wien.)

Ithsytenus hollandiae Boisduval

Endeavour R., Qld., S. Loid, 2♂♂ (Nat.Mus.Vic.)

Daintree R., Qld., purch. from Mr. Groener, 1♂ (Nat.Mus. Vic.)

Cairns, Qld., 1♂ (Nat.Mus.Vic.)

Qld., without exact locality. (Nat.Mus.Vic.)

Cairns, Qld., E. Allen. (Nat.Mus.Vic.)

Kuranda and Townsville, Qld., Jan. 1904, F. P. Dodd. (Nat. Mus.Vic.)

Claudie R. Qld., 28.1.1914. (Nat.Mus.Vic.)

Torokina, Sol. Is., 18.XII.1945, R. Clarke, 2♀♀ (A. N. Burns coll.)

Ithystenus linearis Pascoe

I. Batsch, Stevens, 860. (Naturh.Mus.Wien.)

Ithystenus spinosus Kleine

Neu Pommern, Gazellen Halbinsel, Rechinger. (Naturh. Mus.Wien.)

Ithystenus wallacei Pascoe

Amboine, 1859, Dr. Doleschal. (Naturh.Mus.Wien.)

Lasiorrhynchus barbicornis Fabricius

New Zealand, Spaeth, 91. (Naturh.Mus.Wien.)

Mesetia amoena Blackburn

Tweed R. N.S.W., X.1921, Lea, 2♂♂ (Nat.Mus.Vic.)

Dunoon, Richmond R. N.S.W., 2♀♀ (Nat.Mus.Vic.)

Phoclides collaris Pascoe

Batjan, Molukken 1o, (Naturh.Mus.Wien.)

I have also seen a male of Phoclides bicolor Guer. det. Kleine having the same morphological aspect but differing by a reddish brown colouration on the head, the pronotum, and the elytral processes. As the specimen named

P. collaris Pascoe, also by Kleine shows remains of such colouration it seems to be doubtful if we have really two different species or a single one *P. bicolor* Guer., varying to some extent in colour according to the stage of maturity.

Pseudoceocephalini

Apterorrhinus compressitarsis Senna

N. Qld., without exact locality, 2 sp. (Nat.Mus.Vic.)
Clump Point, N. Qld., 30.IX.1951, J. O. Campbell, 1 sp. (F. E. Wilson coll.)
Dorrigo, N.S.W., R.J.T. 2 sp. (Nat.Mus.Vic.)

Autarcus laticollis Perroud

Neu Caledonien, 1893, 1♂ (Naturh.Mus.Wien.)

Euschizus internatus Pascoe

Dorrigo, N.S.W., 13 sp. (Nat.Mus.Vic.)

Hormocerus reticulatus Fabricius

Endeavour R. Qld., C. French's coll., 6.1.1880, 2♂♂ (Nat. Mus.Vic.)
Cairns, Qld., 3♂♂ 3♀♀ (Nat.Mus.Vic.)
Little Mulgrave R. Qld., H.W.B., 1♂ (Nat.Mus.Vic.)
Rabaul, New Britain, Mars 1953, C. Barrett, 1♂ (Nat.Mus. Vic.)
Nova Guinea, 2♂♂ (Naturh.Mus.Wien.)
Tebing-tinggi, N.O. Sumatra, Dr. Schultheiss, 2♂♂ (Naturh. Mus.Wien.)

Schizotrachelus dichrous Lacordaire

Innisfail, (Geraldton) Qld. (Nat.Mus.Vic.)
Sydney, N.S.W., Carter. (Nat.Mus.Vic.)
Mt. Tamborine, Qld., all together 23 sp. (Nat.Mus.Vic.)

Uropteroides douei Montrouzier

Pipitz, Neu Caledonien, 1889. (Naturh.Mus.Wien.)

Uropteroides gestroi Senna

Torokina, Sol. Is., 21,22,30.X., 19.XI., and 18.XII.1945, R.S. 6♂♂ 7♀♀ (A. N. Burns Coll.)
Milne Bay, Papua, XI. 1945, P. C. Ralph, 1♀ (F. E. Wilson Coll.)
Neu Pommern, Gazellen Halbinsel, Rechinger. (Naturh. Mus.Wien.)

Description of a New Species.

Diurus forficuloides n. sp.

Female: Entirely opaque, piceus with yellowish scales, about 20 mm. long, about as slender as *Mesetia amoena* Blackb.

Prorostrum very short, about one-third of the length of the cylindrical metarostrum, mesorostrum feebly developed, swollen, and divided by a longitudinal sulcus dorsally, mandibles very small, prorostrum nearly polished, metarostrum covered with numerous coarse granules, eyes prominent, vertex short, about as long as the prorostrum, and with similar sculpture as the metarostrum, finely sulcate between the eyes.

Antennae with the first segment clavate, the second distinctly shorter and cylindrical, segments 3–6 cylindrical, becoming gradually shorter and covered with sparsely placed long and inclined dark bristles, segments 7 and 8 shorter again, densely covered with pale yellowish scales, 9 to 11 equal in length, pubescence finer, more dense and shorter.

Pronotum cylindrical behind, conical in front, roughly sculptured, with a series of pale yellowish scales on each side of the median line.

Elytra very slender, the sides parallel nearly to the apex, cylindrical, postero-lateral angles drawn out to short pointed projections, declivity very short, obliquely convex; disc striate-puntate, the strial punctures deep, each puncture giving rise to a small yellow scale-like hair, the scales of the third striae somewhat larger and stouter, those of the fourth striae much larger again and nearly circular in outline; some more of such scales in the lower part of the declivity.

Holotype in the National Museum of Victoria, paratype in collection Schedl.

Locality: Torokina, Solomon Islands, 15.XI. and 18.XII. 1945, R. Clarke, ex. coll. A. N. Burns and F. E. Wilson.

AUSTRALIAN BARK AND TIMBER BEETLES.

By Karl E. Schedl, Lienz, Austria.

155, Contribution to the Morphology and Taxonomy of the Scolytoidea.

Among a lot of Australian Brenthidae I received also seventeen Scolytidae and Platypodidae from the National Museum of Victoria, and nine specimens from the collection of Mr. F. E. Wilson.

In spite of the small number of specimens, this collection contains seven species of Scolytidae, and three species of Platypodidae, including one new. The locality records given below are quite interesting.

New Records.

Scolytidae.

Acacicis abundans Lea

Black Rock, Vic., J. E. Dixon, 1 ♂ (Nat.Mus.Vic.)

Pachycotes australis Schedl

Sydney, N.S.W., 20.VIII.1924, ex. Hoop Pine, W. W. Froggatt, 1 sp. (Nat.Mus.Vic.)

Stephanoderes darwinensis Schedl

Darwin, N. Terr., G. F. Hill, 2 sp. (Nat. Mus.Vic.)

Xyleborus solidus Eichhoff

New South Wales, without exact locality, 3 ♀ ♀ (Nat.Mus. Vic.)

Xyleborus pseudosolidus Schedl

Queensland, from Mr. Search, II.1887, 3 ♀ ♀ (Nat.Mus.Vic.)

Xyleborus compressus Lea

Victorian Alps, Vic., C. French coll., 6.I.1908, 3 ♀ ♀ (Nat. Mus.Vic.)

Xyleborus pseudoangustatus Schedl

Cannington, W. A., R. P. McMillan, 3 ♀ ♀ (F. E. Wilson coll.)

Platypodidae

Diapus 5-spinatus Chapuis

Mt. Lamington, Papua, C. T. McNamara, 1 ♀ (F. E. Wilson coll.)

Platypus subgranosus Schedl

Australia, without exact locality, 3 sp. (Nat.Mus.Vic.)

Platypus hastulifer n. sp.

Male: Reddish-brown, 3·9 mm. long, 3·6 times as long as wide. A very distinct new species nearly allied to *Platypus severini* Blandf. but much smaller, the pronotum more coarsely punctured, the punctuation of the elytral interstices more distinct, the elytral processes trifid.

Front: Flat, subopaque, very densely but shallowly punctured, pubescence very short and inconspicuous.

Pronotum: Feebly longer than wide, rather densely covered with punctures varying in size, coarser and more numerous behind, femoral emarginations moderately deep.

Elytra: Feebly wider (32:30) and more than twice as long as the pronotum, with the sides subparallel on the basal half, gradually incurved and then drawn out into two slender processes very similar to those of *Platypus severini* Blandf. from Japan; disc regularly and rather finely striate punctate, the strial punctures rather densely placed, the interstices wide, each one with a not quite regular row of punctures being little finer than those of the striae; declivity gently convex, the striae gradually fading out, the interstitial punctures bearing short erect yellowish bristles; the apical processes trifid, the sculpture fine, semirugose, the short hairs more densely placed.

Holotype and one paratype in coll. F. E. Wilson, two paratypes in collection Schedl.

Locality: Crocodile Is., and Millingimbi, N. Aust., C. Barrett.

AUSTRALITES FROM KANAGULK, TELANGATUK EAST AND TOOLONDO, WESTERN VICTORIA.

By George Baker, D.Sc.

Abstract.

The weights, specific gravity values, dimensions, radii of curvature of posterior and anterior surfaces, and intercepts of the radical line upon the polar axis, have been determined for 48 round and elongated australites with typical button-, lens-, core-, oval-, boat-, dumbbell- and teardrop-shapes from Kanagulk (Lat. 37° 8′ S. and Long. 141° 50′ E.), and nearby localities at Telangatuk East and Mt. Talbot, Toolondo, vicinity of Harrow in Western Victoria. Refractive indices and specific refractivities have been determined for 24 of these australites, so selected as to represent the several shape groups and to cover variations in specific gravity within and between the shape groups. The frequency distribution of the specific gravity values, the relationships between weight of particular shapes and their respective specific gravity values, and the relationships between (i) depth and diameter of round forms, and (ii) radii of curvature of posterior and anterior surfaces shown by means of scatter diagrams, reveal no abnormalities among these australites. The results accord with the recently advanced theory that, allowing for tertiary processes of erosion (etching and abrasion) while resting upon the earth's surface, the shapes of australites as found, are secondary shapes, developed from a few typical, small primary shapes (spheres, spheroids, ellipsoids, dumbbells and apioids) by ablation and fusion stripping during ultrasupersonic airflow over their forwardly directed surfaces, whilst travelling earthwards, without rotation, at high speeds through the atmosphere.

Introduction.

Three collections of australites totalling 34 specimens from Kanagulk, one collection of five australites from Mt. Talbot, Toolondo, and a collection of nine australites from Telangatuk East, have been studied from the aspects of their shape, size, radii of curvature of back (Rb) and front (Rf) surfaces, specific gravity and refractive index values, and their specific refractivities. All of these localities are near Harrow in the Western District of Victoria.

The three collections from Kanagulk and the one from Mt. Talbot, Toolondo, were submitted for examination by four separate owners, per courtesy of the National Museum of Victoria, Melbourne.

Location and Mode of Occurrence.

Kanagulk lies on Lat. 37° 8′ S. and Long. 141° 50′ E., some 35 miles south-south-west of Horsham, and 13 miles almost due east of Harrow, Western District of Victoria. Telangatuk East is approximately 8 miles north-east of Kanagulk, and Mt. Talbot is 6 miles north-east of Telangatuk East.

The specimens constituting the collection from Kanagulk, are herein numbered 1 to 34 for convenience of reference (see Tables 2 and 8; those from Telangatuk East are numbered 35 to 43, and those from Mt. Talbot, Toolondo, 44 to 48.

Among the Kanagulk specimens, numbers 1 to 12 were collected on cultivated land by Mr. R. T. P. Elliott over the past twenty years. Numbers 13 to 15 came from uncultivated areas, and were collected by Mr. A. C. Bennett during the past four or five years. Numbers 16 to 34 were collected by Mr. W. R. Jasper, all within a radius of 1 mile of his homestead on the property of " Foster ", Kanagulk, Parish of Telangatuk; only four of these were found during the past ten years. The Jasper collection originally contained 40 specimens, but many of these were given away, including one large round core measuring 2½ to 3 inches across. Prior to 1910, these australites were known locally as " black diamonds " because they scratched ordinary glass. Information supplied by Mr. W. R. Jasper relating to the field occurrence of the Kanagulk australites, reveals that some were found on the surface of the ground amid surrounding superficial materials consisting largely of magnetic and non-magnetic ferruginous accretionary growths (" buckshot gravel "), resting upon yellow clay. Most, however, were discovered where the surface soil has been cultivated to a depth of 3 inches to 5 inches. Specimens 13 to 15, and most of those numbered 16 to 34, came from an area of 5 or 6 acres in allotment 84, adjoining allotment 83A, and the remainder were found in allotments 64 and 87, Parish of Telangatuk.

Numerous enquiries in reference to australites, made throughout the district by Mr. Jasper, have not revealed the existence of other collections, apart from one or two specimens. A resident some 10 miles north-west of " Foster " reported finding a button-shaped australite complete with circumferential flange, in clay 15 feet below the surface in a well; this specimen could have fallen down from the surface during construction of the well, or from its sides subsequently. The largest specimen noted in the Kanagulk district, is stated to be a round australite core some 2½ inches in diameter, found 5 miles north-west of " Foster ", but the specimen was not submitted for examination.

The largest complete form among the 48 specimens examined, is an oval-shaped australite core (No. 16, Table 2), weighing 39·13 grams, measuring 36 mm. long, 30 mm. wide, and 27 mm. thick, and having a specific gravity value of 2·426. In contrast, the smallest complete specimen in the collection is an oval-shaped australite (No. 7, Table 2), weighing 0·792 grams, measuring 11 mm. long, 9 mm. wide, and 5·5 mm. thick, and with a specific gravity value of 2·408.

The specimens from Telangatuk East (Nos. 35 to 43, Table 2), are registered as numbers 3,418 to 3,426 in the Rock and Mineral Collection of the Melbourne University Geology Department. They are all complete or nearly complete forms, the maximum and minimum weights of which, fall well within the range of weights of the Kanagulk specimens; the same applies to the five australites from Mt. Talbot, Toolondo (Nos. 44 to 48, Table 2), which were submitted for examination by Mr. L. Officer.

On many of the Kanagulk australites, adventitious ferruginous clay had become firmly cemented into some of the bubble pits and into the more deeply etched grooves on several specimens, also into the gap region between circumferential flange and body portion of most of the flanged australites. This is a secondary product of terrestrial origin, and in no way to be connected with australite origin. Prior to weight and specific gravity determinations, it was necessary to remove this clay by boiling in concentrated hydrochloric acid and scrubbing. This treatment had no perceptible effect upon the australite glass itself, as checked by weighing a clean specimen before and after immersion for two hours in boiling HCl, after which time, no change in weight could be detected.

Nature of the Australites.

Eighty-five per cent. of the 34 Kanagulk australites are complete or nearly complete forms, while the remainder are relatively large fragments all of which provide sufficient evidence of the original shape type from which they were broken. The nature of these fragments points to natural fracture rather than working by aboriginal man. Sixty-six per cent. of the complete or nearly complete forms have round shapes (i.e., are circular in plan aspect, although lenticular in side aspect). The remainder are elongated (oval-, boat-, dumbbell-, and teardrop-shaped in plan, mainly lenticular in side aspect). If the five fragments are introduced into the comparisons of the proportions of round to

elongated australites in the Kanagulk collections, the percentage of round forms is reduced to 62. The various shape types represented from the three localities, are listed in Table 2.

All of the Telangatuk East and the Mt. Talbot, Toolondo australites are complete or nearly complete forms, although the Mt. Talbot specimens are generally much more weathered (etched and somewhat abraded).

Fourteen of the total of 48 australites reveal flow ridges still in a good state of preservation on their anterior surfaces. Most of these are round forms of australites (ten button-shaped and two lens-shaped forms). Of the two elongated forms showing flow ridges, one is a small oval-shaped australite, and the other teardrop-shaped with one concentric ridge on the bulbous end, and four ridges extending across the anterior surface in arcuate fashion from side to side of the constricted end.

The proportions of the three different types of flow ridges represented, are listed in Table 1.

Table 1.—Proportions of Flow Ridge Types.

Nature of flow ridges	Percentage
Concentric	57
Clockwise spiral	14
Counterclockwise spiral	29
	100

Specimens without flow ridges are (*a*) the larger australite cores, and (*b*) some of the button- and lens-shaped forms which have been strongly etched and partially abraded, so that the original flow ridge structures have been more or less removed.

For comparison with the percentages of the types listed in Table 1, flow ridges displayed by 100 australites from the Nirranda Strewnfield, 105 miles distant to the south-east (Baker, 1956), occur in the following proportions—46 per cent. concentric, 27 per cent. clockwise spiral, and 27 per cent. counterclockwise spiral.

The shapes and sculpture patterns of the majority of the australites from Kanagulk, Telangatuk East, and Mt. Talbot, are generally comparable with those of many other well-preserved australites described from other parts of Western Victoria (see Baker, 1937, 1940a, 1940b, 1944, 1946, 1950, 1955a, 1955b, and 1956). Two in particular, however, are worthy of more detailed description in being somewhat unusual (Specimens Nos. 2 and 19,

Table 2). One of these (No. 2) is the largest round australite core which the author has so far observed to possess remnants of a flange. The specimen was produced from a sphere of australite glass having an original diameter of approximately 4·5 cms. as obtained graphically from determination of the radius of curvature of the posterior surface, which is a remnant of the primary surface. Such a sphere would have weighed about 175 grams, assuming its specific gravity to have been the same (2·412) as that of the ultimately produced secondary form—a round core resulting from ablation of the original sphere while traversing the earth's atmosphere at ultrasupersonic velocity. Approximately five-sixths by weight of the original sphere was ablated away in this manner, leaving a secondary form weighing 31·599 grams and measuring 32 mm. in diameter, and 22 mm. in thickness. The second specimen (No. 19) is a dumbbell fragment which has lost one of its bulbous ends as a result of relatively recent fracture, and reveals some extraordinary features. An unusually long, relatively smooth, attenuated waist region is preserved and reveals well-developed longitudinal flow lines. This is attached to the remaining bulbous end in such a way as to recall the appearance of attachment of the stalk to the head of a mushroom. The bulbous end shows a complex pattern of " crinkled " flow ridges, and is almost circular in cross-sectional aspect, having only lost approximately one-fourteenth part of its original diameter (20 mm.) by ablation.

Measurements of the Australites.

The weights, specific gravity values, dimensions, radii of curvature (R_B = back surface, R_F = front surface*), and intercepts made by the diameter (= radical line) upon the depth line (= polar axis), are shown in Table 2 for the individual specimens. ON represents the distance to the back pole, and OM the distance to the front pole from the central point in the plane containing the diameter line.

The specific gravity values were obtained by weighing in air and in distilled water (T° C. = 15·5), on an air-damped chemical balance.

For purposes of comparison with forms that have lost their flanges, the diameter, width and length measurements of specimens with attached flange or flange remnants, were made across the body portion of each form, so that all such measurements are ex-flange. Width and depth measurements of Specimen No. 42,

* The front or anterior surface was directed earthwards during downward atmospheric flight.

TABLE 2.

No.	Shape Type	Weight (gms.)	Specific Gravity	Diameter (mm.)	Depth (mm.)	Flange Width (mm.)	Width (mm.)	Length (mm.)	R_B (mm.)	R_F (mm.)	ON (mm.)	OM (mm.)
	KANAGULK.											
	R. T. P. Elliott Collection.											
1	Button (with flange band) ..	3·860	2·405	19	9	..	..	..	12·5	11·5	4	5
2	Round Core (with flange remnant)	31·599	2·412	32	22	..	..	..	21·5	20	10	12
3	Hollow Round-Form Fragment	8·668	2·400	25·5	31	..	..	..	21·5	16·5	4	27
4	Boat Core	5·445	2·415	..	12	..	16	23	26	21	5	7
5	Button (with flange remnant) ..	2·285	2·398	14	8	3	..	..	8	9	4·5	3·5
6	Oval (flat)	1·467	2·417	..	4	..	14	16	20·5	11·5	2	2
7	Oval (small)	0·792	2·408	..	5·5	..	9	11	7	7	2·5	3
8	Button (with flange remnants)	2·140	2·404	13	8	3	..	..	7·5	8	4·5	3·5
9	Boat Fragment (with attached flange)	3·234	2·380	..	10·5	2·5	17	..	8·5	10·5	7	3·5
10	Oval Core	1·981	2·415	..	10	..	12	14	9·5	7	3·5	6·5
11	Core Fragment	1·996	2·416	..	10·5	..	15	..	14·5	10	3·5	7
12	Boat Core	17·974	2·383	..	16	..	19	51	11·5	9·5	5	11
	A. C. Bennett Collection.											
13	Round Core	18·218	2·396	26	19	..	..	..	14·5	18·5	7	12
14	Button (with flange remnants)	3·680	2·413	16	10·5	3	..	..	10	9·5	5·5	5
15	Button Fragment (with flange band)	3·775	2·383	..	17·5	..	..	..	15	11	5·5	12
	W. R. Jasper Collection.											
16	Oval Core (large)	39·133	2·426	..	27	..	30	36	23·5	23·5	13·5	13·5
17	Boat Core	22·305	2·441	..	16	..	19	44	10	10	8	8
18	Boat Core	12·659	2·414	..	13	..	14	45	9·5	8·5	5	8
19	Dumbbell Fragment	14·097	2·386	20	18·5	..	..	..	10	10	10	10
20	Boat Core	8·904	2·406	..	14	..	17	28·5	15·5	10	3·5	10·5
21	Round Core	25·580	2·390	31	22	..	..	..	19·5	18	10	12
22	"Aerial Bomb"	16·700	2·391	21	..	..	..	30	10·5	10·5	10·5	10·5
23	Round Core	19·463	2·394	27	20	..	..	..	17·5	16	9	11
24	Round Core	15·713	2·403	28	16	..	..	..	20	15·5	6	10

TABLE 2—*continued*.

No.	Shape Type	Weight (gms.)	Specific Gravity	Diameter (mm.)	Depth (mm.)	Flange Width (mm.)	Width (mm.)	Length (mm.)	R_B (mm.)	R_F (mm.)	ON (mm.)	OM (mm.)
	KANAGULK—*continued*. *W. R. Jasper Collection*—continued.											
25	Button (with flange remnants)	5·971	2·406	19	13	5	..	..	11·5	12	7	6
26	Button (with flange remnant)	3·562	2·404	18	8	3	..	..	10·5	12·5	4·5	3·5
27	Button (with flange remnant)	4·406	2·390	18	9·5	3	..	..	10·5	11	5	4·5
28	Button (with flange band) ..	3·400	2·408	18	10	..	..	..	10	10·5	5·5	4·5
29	Button	3·982	2·403	18	10·5	..	..	..	11	10·5	5·5	5
30	Button (with minute flange remnant)	2·225	2·394	15	8	..	..	..	8·5	10	4·5	3·5
31	Lens	1·691	2·399	15	7	..	..	..	9·5	10	3·5	3·5
32	Lens	1·678	2·404	14·5	6·5	..	..	..	9·5	10	3·5	3
33	Lens	1·427	2·410	13·5	6·5	..	..	..	9·5	9·5	3·5	3
34	Lens	1·538	2·416	13	7	..	..	..	7·5	8	4	3
	TELANGATUK EAST. *Melbourne University Collection.*											
35	Oval Core	12·686	2·429	..	19	..	21	27	17	11	10·5	8·5
36	Oval Core	13·204	2·437	..	15·5	..	22·5	27	16·5	15	9·5	6
37	Round Core	9·732	2·422	21	15	..	..	..	20	18·5	7	8
38	Round Core	8·776	2·397	20	17·5	..	..	..	14	14	9	8·5
39	Button (with flange remnants)	4·681	2·378	19	11	..	..	..	12	12	6	5
40	Lens	3·872	2·400	17	10	..	..	..	11	11	5	5
41	Button (with flange band) ..	1·732	2·401	14	7	..	..	..	10	12·5	4	3
42	Dumbbell	2·764	2·408	..	6	..	9·5	29·5	6	5·5	2·5	3·5
43	Teardrop	2·785	2·401	..	8·5	..	13·5	22	7	11·5	5·5	3
	MT. TALBOT, TOOLONDO. *L. Officer Collection.*											
44	Lens	3·712	2·410	17	11·5	..	..	..	9	10·5	6·5	5
45	Lens	2·894	2·424	17·5	8	..	..	..	12	12	4	4
46	Lens	3·022	2·414	17	9	..	..	..	11	10·5	4	5
47	Button (with flange band) ..	3·231	2·409	17	9	..	..	..	10	10·5	4·5	4·5
48	Button (with flange remnants)	1·980	2·392	13	8·5	..	..	..	7·5	9	5	3·5

a dumbbell-shaped form, were determined across the bulbous ends, the waist region of this specimen measuring 8·5 mm. wide and 5 mm. thick. Width and depth measurements of Specimen No. 43 were determined across the widest and thickest portions of the bulbous end.

Radii of curvature values (R_B and R_F), and the intercept values (ON and OM) on the depth line (polar axis), were determined graphically from silhouette tracings magnified 5·5 times. All direct measurements, graphical measurements and calculations of measurements, have been taken to the nearest 0·5 mm. Radius of curvature values for the elongated australites are listed for determinations made across the widths of the specimens, but not along the lengths since the results indicate circular cross sections only for positions normal to the long axes of elongated australites.

The flange bands referred to on Specimens Nos. 1, 15, 28 and 41 (Table 2), mark the former positions of attachment of the circumferential flanges to equatorial edges of the posterior surfaces of the body portions. Their presence provides proof

TABLE 3.

Locality	Number of Specimens	Percentage	Total Weight (gms.)	Range in Weight (gms.)	Average Weight (gms.)	Range in Specific Gravity	Average Specific Gravity
Kanagulk	34	70	314·577	0·792 to 39·133	9·252	2·380 to 2·441	2·404
Telangatuk East ..	9	19	60·232	1·732 to 13·204	6·692	2·378 to 2·437	2·408
Mt. Talbot, Toolondo	5	11	14·839	1·980 to 3·712	2·968	2·392 to 2·424	2·410
Totals ..	48	100	389·648	0·792 to 39·133	8·717	2·378 to 2·441	2·405

that the original complete round forms were button-shaped. The vitreous, very little etched character of the surfaces of these flange bands, points to relatively recent fracturing away and loss of the flange structure.

The total weights, range and average weights, and the range and average specific gravity values of the australites from Kanagulk, Telangatuk East and Mt. Talbot, Toolondo, are shown in Table 3.

There is a notable absence from these collections (cf. Table 2) of canoe-shaped australites, aberrant shapes, small forms (such as round dises and oval plates), complete flanges and flange fragments, compared with australites from Port Campbell on the south coast of Western Victoria (Baker, 1937, 1940, 1946, 1955b). The smaller forms of australites have thus evidently been overlooked in the field, or else, being relatively fragile, they may have disintegrated to smaller fragments which would go unnoticed unless specifically searched for.

The averages and ranges in values of these various measurements for the different shape groups represented among the Kanagulk, Telangatuk East and Mt. Talbot, Toolondo australites, are listed in Tables 4, 5 and 6.

TABLE 4.—NUMBERS, WEIGHTS, AND SPECIFIC GRAVITY VALUES.

Shape Types	Number in Each Group	Percentage	Range in Weight (gms.)	Average Weight (gms.)	Range in Specific Gravity	Average Specific Gravity
			Round Forms (64·5 *per cent.*)			
Buttons	14	29	1·732 to 5·971	3·369	2·378 to 2·413	2·400
Lenses	8	16·5	1·427 to 3·872	2·041	2·399 to 2·416	2·406
Round Cores	7	15	8·776 to 31·599	18·869	2·390 to 2·422	2·402
Button Fragment ..	1	2	..	3·775	..	2·383
Hollow Round-Form Fragment	1	2	..	8·668	..	2·400
			Elongated Forms (35·5 *per cent.*)			
Ovals	2	4·5	0·792 to 1·467	1·130	2·408 to 2·417	2·413
Oval Cores	4	8·5	1·981 to 39·133	16·751	2·415 to 2·437	2·427
Boat Fragment	1	2	..	3·234	..	2·380
Boat Cores	5	10·5	5·445 to 22·305	13·457	2·383 to 2·441	2·412
Dumbbell	1	2	..	2·764	..	2·408
Dumbbell Fragment ..	1	2	..	14·097	..	2·386
"Aerial Bomb"	1	2	..	16·700	..	2·391
Teardrop	1	2	..	2·785	..	2·401
Core Fragment	1	2	..	1·996	..	2·416
Totals	48	100·0	0·792 to 39·133	8·717	2·378 to 2·441	2·405

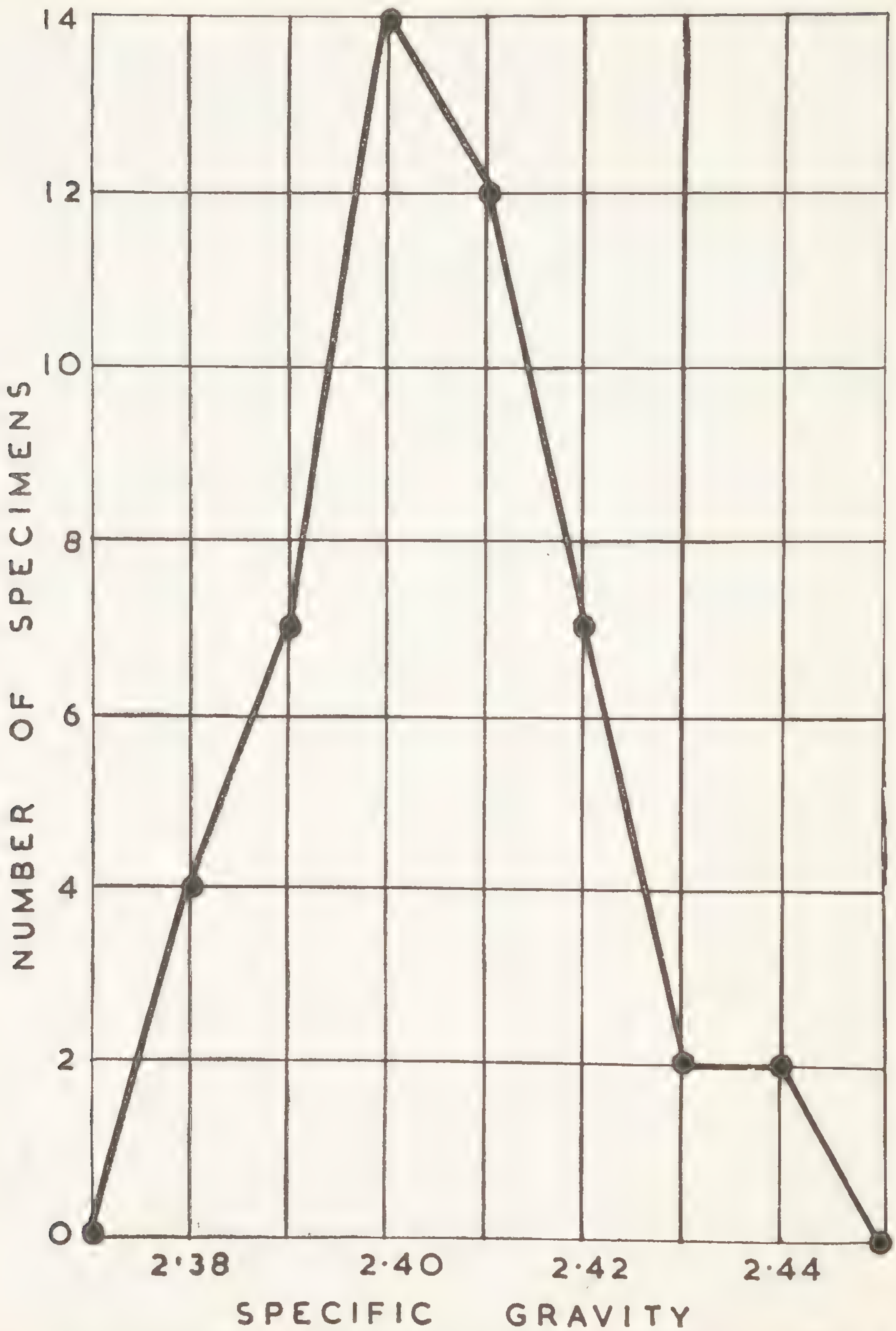

Fig. 1.—Frequency distribution of 48 specific gravity values of australites from Kanagulk (34), Telangatuk East (9), and Mt. Talbot, Toolondo (5).

Relationships between Specific Gravity and Weight.

The frequency distribution of the specific gravity values (taken to the second decimal place), is shown in Figure 1.

The over-all mode of the frequency distribution for the three localities, is 2·40 (Fig. 1), as compared with a calculated average specific gravity of 2·405.

The specific gravity values have been plotted in Figure 2 against the weight values for the 39 complete australites from the three localities.

The scatter diagram (Fig. 2) serves to illustrate that there are both heavier and lighter weight forms in the same and in different shape groups, which have much the same specific

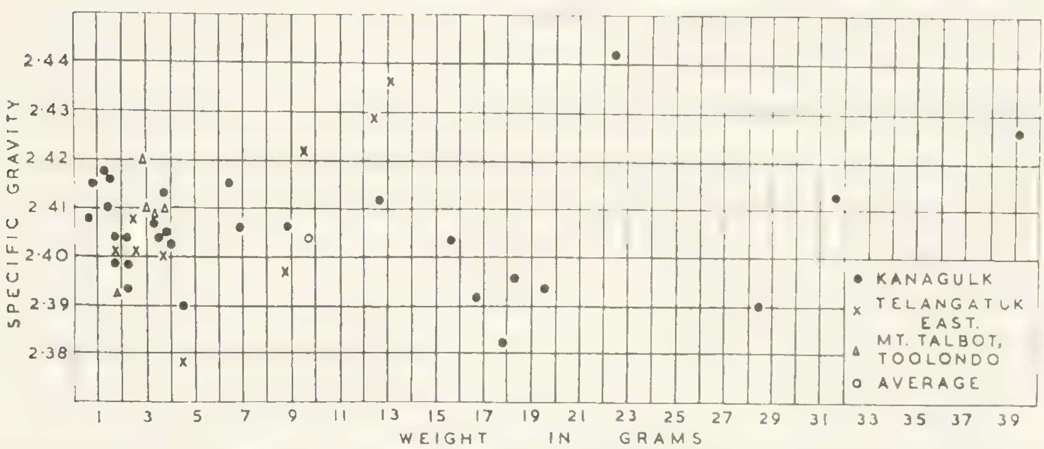

Fig. 2.—Scatter diagram illustrating specific gravity-weight relationships for complete australites from Kanagulk (29), Telangatuk East (9), and Mt. Talbot, Toolondo (5).

gravity, e.g. forms with a specific gravity of 2·41, range in weight from approximately 0·8 to nearly 32 grams. Conversely, a number of individuals in the same or in different shape groups, have approximately the same weight, but reveal a range in specific gravity, e.g. types weighing about 4 grams, vary in specific gravity from 2·378 to 2·415. The average weight of the complete forms plotted in Figure 2, is 8·323 grams, and the average specific gravity is 2·405.

Relationships between Dimensions.

The relationships between depth and diameter values of 30 round forms of australites represented among the specimens from Kanagulk, Telangatuk East and Mt. Talbot, Toolondo, are shown by the scatter diagram, Figure 3.

The scatter diagram (Fig. 3) reveals that diameter is greater than depth for each specimen (hollow round form excepted—cf. Table 2, No. 3). The ratios between diameter and

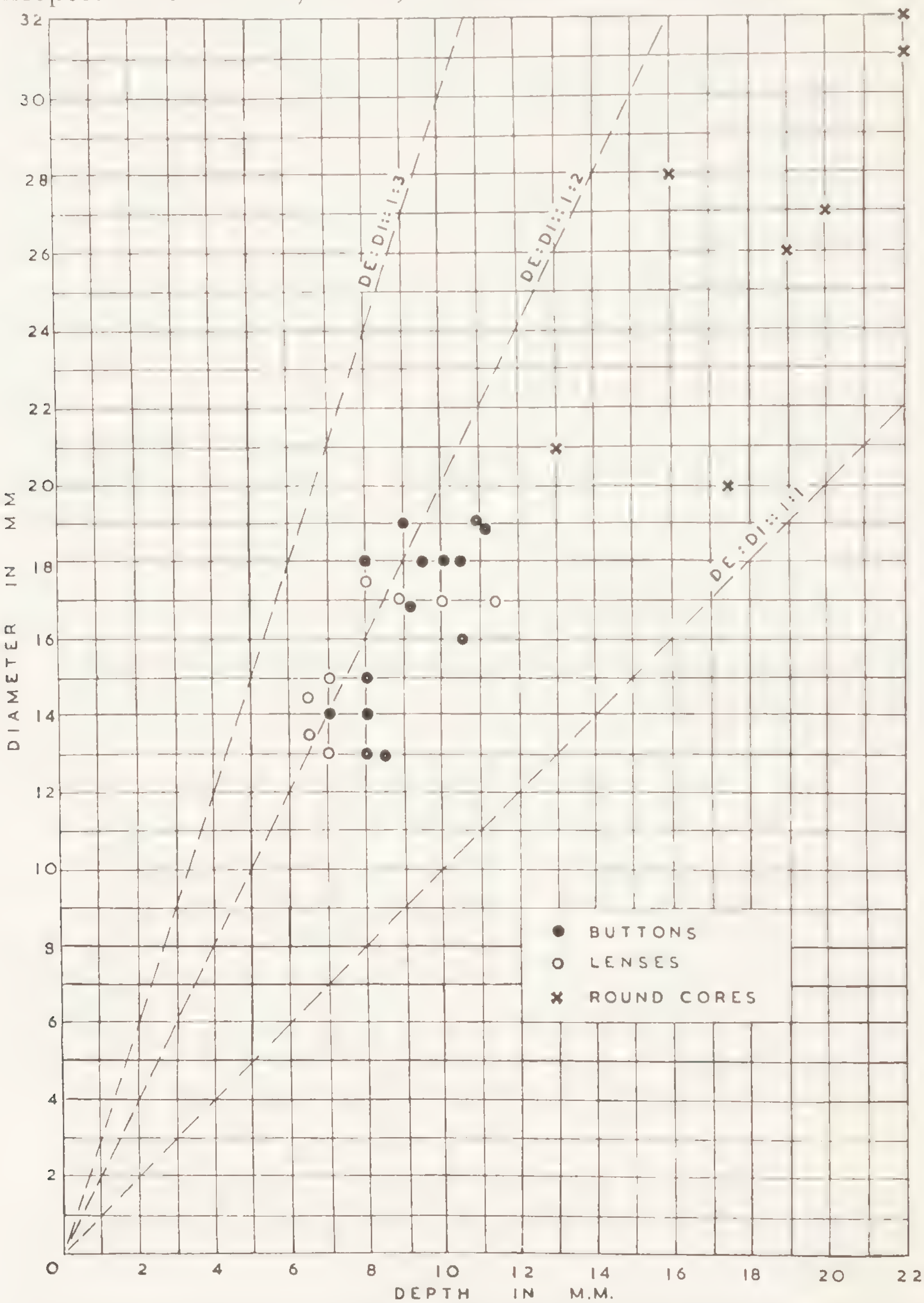

Fig. 3.—Scatter diagram showing relationship of depth and diameter values for round forms of australites from Kanagulk, Telangatuk East and Mt. Talbot, Toolondo.

depth are typically Di : De :: 1·5 : 1 to Di : De :: 2 : 1. There is a general increase in depth with increase in diameter, but some forms with the same depth, have different diameter values, e.g. 13 to 18 mm. diameter for a depth of 8 mm. Conversely there are other forms with the same diameter which have different depth values, e.g. 8 to 10·5 depth for a diameter of 18 mm. Such relationships are comparable with those of the round forms of australites from Port Campbell, south-western Victoria (Baker, 1955b, Fig. 11, p. 181), and like them, it is apparent that during atmospheric flight, differential ablation of original forms of the same or of different size, has yielded secondary modified shapes sometimes with the same depth, sometimes with the same diameter.

Relationships between Radii and Arcs of Curvature.

Relationships between the radii of curvature of the posterior (Rʙ) and anterior (Rꜰ) surfaces, reveal a typical scatter of values (Fig. 4), generally comparable with those shown for the Port Campbell australites (Baker, 1955b) and for the Nirranda Strewnfield australites (Baker, 1956).

It was determined from the silhouette tracings that each radius of curvature for each australite, is in itself constant for all radial sections taken through the plane containing the polar axis of any individual round forms; this does not apply, however, to the elongated forms of australites, where the only radius of curvature considered herein, is that for sections normal to the long axis.

The distribution of Rʙ and Rꜰ values in the scatter diagram (Fig. 4) reveals that Rʙ values are confined to the range 6 mm. to 26 mm., and Rꜰ values to the range 5·5 mm. to 23·5 mm. The general trend evident from the scatter diagram (Fig. 4), is one of increasing Rꜰ with increased Rʙ, thus indicating that processes of ablation generally followed a steady, regular pattern on forms of different original size. Round forms with the same Rʙ but different Rꜰ values, e.g. Rꜰ range of 9·5 mm. to 12·5 mm. for a value of 10 mm. for Rʙ, indicate differential ablation of spheres of the same original size (since Rʙ is constant and represents the radius of curvature of the posterior surface, which is a remnant of the primary sphere surface). Round forms with the same Rꜰ but different Rʙ values (e.g. Rʙ range of 10·5 mm. to 15 mm. for a value of 11 mm. for Rꜰ), indicate differential ablation of spheres of different original size (since the radius of curvature of the primary spheres ranged from 10·5 to 15 mm.).

All values plotted in the scatter diagram (Fig. 4) fall within the range RB : RF :: 2 : 1 to RB : RF :: 1 : 2, further indicating that processes of frontal ablation* maintain relatively normal

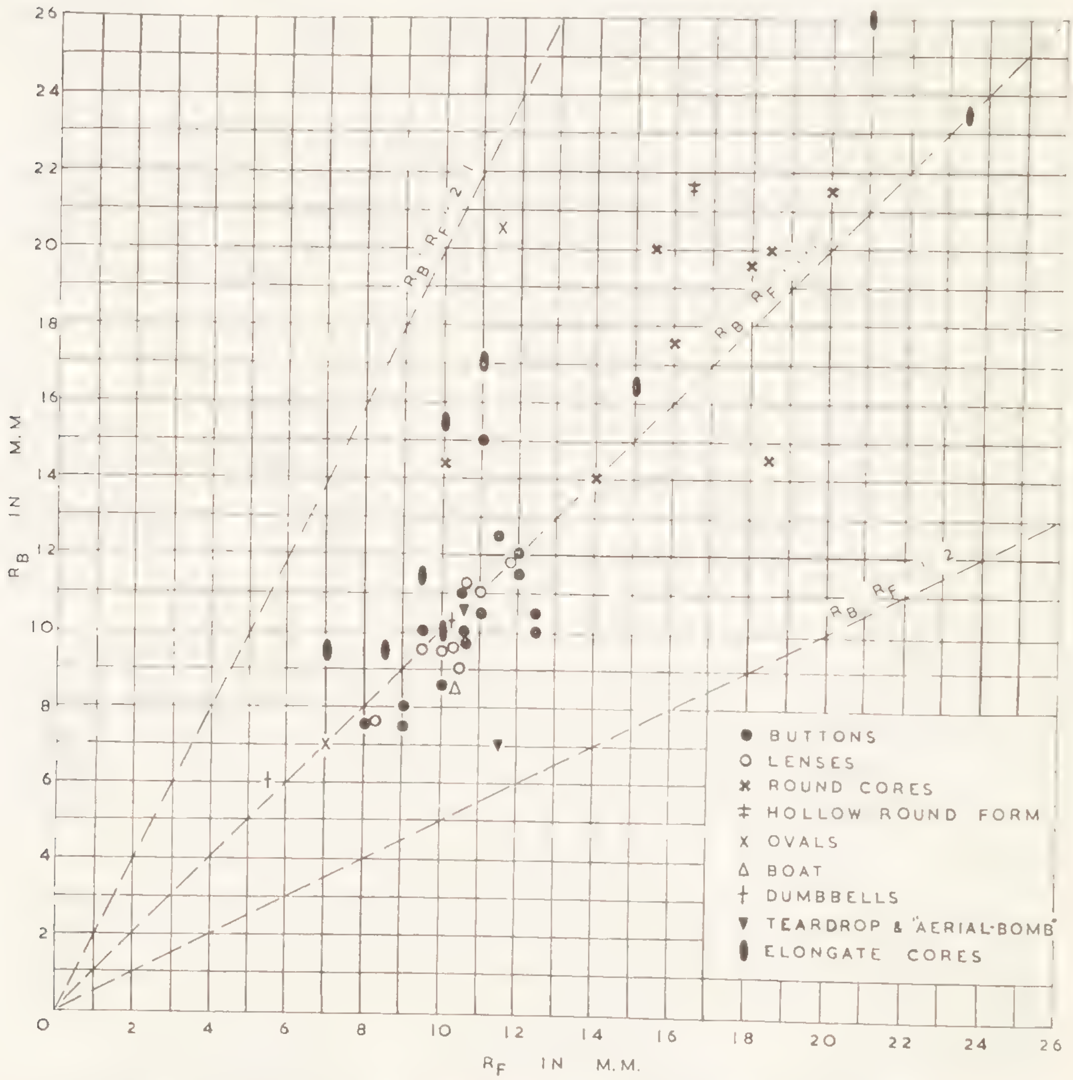

Fig. 4.—Scatter diagram showing relationships of RB and RF values of australites from Kanagulk, Telangatuk East and Mt. Talbot, Toolondo. (RB and RF = radii of curvature of posterior and anterior surfaces of the australites.)

arcs of curvature upon the diminishing anterior surfaces of australites; only forms that become ablated to 1 to 2 mm. in thickness ultimately become more or less flat and thus have infinite arcs and radii of curvature.

* The phenomenon of frontal ablation (and associated phenomena) arises from and is controlled largely by the effects of ultrasupersonic airflow at the high speeds of flight of australites downwards through the atmosphere (see Baker, 1956).

For the round forms, which constitute 64·5 per cent. of the australites examined, 37·5 per cent. have greater values for R_B than for R_F, and 50 per cent. of the forms in this group consist of the larger round cores; steeper curvatures are thus developed on the front surfaces by ablation. In 15·5 per cent., R_B and R_F are equal in amount, and in this group, 60 per cent. of the forms are lenses; since similar curvatures are maintained by ablation, the ultimate secondary forms are perfectly lenticular. In 47 per cent., R_B is less than R_F, and 66·5 per cent. of the forms in this group are flanged buttons; flatter curvatures are thus developed on the front surfaces by ablation. It is thus seen that on the larger round forms (round cores), ablation produces steeper arcs of curvature on front surfaces. As the forms become reduced in size on further ablation, the arcs of curvature tend to become flatter on the front surfaces (button-shaped australites); with further decrease in thickness, ablation processes produce slightly steeper arcs of curvature of front surfaces, which in the larger proportion of the lenses, become the same as that of posterior surfaces. The final stage is one where the smaller of the lens-shaped forms pass by continued ablation to the thin disc-shaped australites.

Relationships between Intercepts.

The relationships of the intercepts ON and OM (see Baker, 1956) cut off on the depth line (polar axis) by the diameter line (radical line), show trends which are comparable with and governed by the relationships between the radii of curvature of the posterior and anterior surfaces of the australites. Examples in which the value of OM is greater than that of ON, are made up of 64 per cent. core-shaped forms, 18 per cent. button-shaped, and the remainder lens-shaped. In these forms, the back pole (N) is thus nearer to the centre of the plane containing the radical line, hence the greater bulk of australite glass is located on the front pole side of the radical line; this is more especially pronounced in the australite cores. Examples with OM and ON equal in value, are comprised of 60 per cent. lens-shaped forms, 20 per cent. button-shaped, and 20 per cent. cores, in which the back (N) and front (M) poles are equally spaced from the radical line and since $R_B = R_F$, such forms tend to be lenticular in side aspect; this applies more particularly to the lens-shaped forms which are largely perfectly lenticular. Examples in which OM is less than ON, consist of 81 per cent. button-shaped forms and 19 per cent. lens-shaped. In them, the front pole (M) is nearest to the centre of the plane containing the radical

Table 5.—Dimensions.

Shape Types	Range in Depth (mm.)	Average Depth (mm.)	Range in Diameter (mm.)	Average Diameter (mm.)	Range in Width (mm.)	Average Width (mm.)	Range in Length (mm.)	Average Length (mm.)
Buttons	7 to 13	9·5	13 to 19	16·5				
Lenses	6 to 10	7·5	13 to 17	14·5	..	..		
Round Cores ..	15 to 22	19·0	20 to 32	26·0			..	
Button Fragment ..		..	..					
Hollow Round-Form Fragment ..	..	31·0	..	25·5				
Ovals	4 to 5·5	4·5	..	..	9 to 14	11·5	11 to 16	13·5
Oval Cores	10 to 27	18·0	..	..	12 to 30	21·5	14 to 36	26·0
Boat Fragment ..	..	11·0	..	..	..	17·0	..	
Boat Cores	12 to 16	14·0	..	..	14 to 19	17·0	23 to 51	38·0
Dumbbell	..	6·0	..	..	..	9·5	..	29·5
Dumbbell Fragment ..	..	20·0	..	..	..	20·0	..	..
" Aerial Bomb " ..	..	..	..	..	..	21·0	..	30·0
Teardrop	..	8·5	..	..	..	13·5	..	22·0
Core Fragment ..	..	10·5	..	..	..	15·0		
Totals ..	4 to 27	12·0	13 to 32	18·5	9 to 30	16·5	11 to 51	29·0

Table 6.—Radii of Curvature and Intercept Values.

Shape Types	Range of R_B (mm.)	Average R_B (mm.)	Range of R_F (mm.)	Average R_F (mm.)	Range of ON (mm.)	Average ON (mm.)	Range of OM (mm.)	Average OM (mm.)
Buttons	7·5 to 12·5	10·0	8 to 12·5	11·0	3·5 to 7	5·5	3 to 6	4·5
Lenses	7·5 to 11	9·5	8 to 11	9·5	3·5 to 5	4·0	3 to 5	3·5
Round Cores ..	14 to 21·5	18·0	14 to 20	17·0	6 to 10	8·5	8 to 12	10·5
Button Fragment ..	..	15·0	..	11·0	..	5·5	..	12·0
Hollow Round-Form Fragment ..	..	21·5	..	16·5	..	4·0	..	27·0
Ovals	7 to 20·5	14·0	7 to 11·5	9·0	2 to 2·5	2·0	2 to 3	2·5
Oval Cores	9·5 to 23·5	16·5	7 to 23·5	14·0	3·5 to 13·5	9·5	6 to 13·5	8·5
Boat Fragment ..	..	8·5	..	10·5	..	7·0	..	3·5
Boat Cores	9·5 to 26	14·5	8·5 to 21	12·0	3·5 to 8	5·5	7 to 11	9·0
Dumbbell	..	6·0	..	5·5	..	2·5	..	3·5
Dumbbell Fragment ..	..	10·0	..	10·0	..	10·0	..	10·0
" Aerial Bomb " ..	..	10·5	..	10·5	..	10·5	..	10·5
Teardrop	..	7·0	..	11·5	..	5·5	..	3·0
Core Fragment ..	..	14·5	..	10·0	..	3·5	..	7·0
Totals ..	7 to 26	12·5	7 to 23·5	11·5	2 to 13·5	6·0	2 to 13·5	7·0

line, so that the greater bulk of australite glass is thus situated on the back pole side of the radical line, and this is more pronounced among the button-shaped forms.

Taken in conjunction with Rb—Rf relationships, the intercept relationships are of such a nature as to indicate that among the round forms of australites, there has been greatest volume reduction by frontal ablation of the primary spheres of australite glass which ultimately yielded lens- and button-shaped forms. Such spheres were originally somewhat smaller than the primary spheres from which the australite cores were produced by ablation.

The primary spheres from which the round forms of the Kanagulk, Telangatuk East and Mt. Talbot australites were produced, ranged in diameter from 1·5 to 4·3 cms.; those from which lenses were formed, ranged from 1·5 to 2·2 cms., those from which the button-shaped forms resulted ranged from 1·5 to 2·5 cms., and those which yielded cores, ranged from 2·8 to 4·3 cms.

Comparable modifications of primary forms of revolution such as the spheroid, dumbbell and apioid, resulted in the variations in Rb — Rf and ON — OM relationships noted for the various elongated forms of australites from the same localities (cf. Table 2).

Comparisons with Other Localities.

The ranges and average values for the weight and specific gravity of the australites from the Kanagulk — Telangatuk East — Mt. Talbot district, are compared in Table 7 with those determined from other localities in the Western District of

Table 7.

Concentration Centre	Number of Complete Specimens	Range in Weight of Complete Specimens (gms.)	Average Weight of Complete Specimens (gms.)	Range in Specific Gravity	Average Specific Gravity
Port Campbell	212	0·065 to 56·482	2·734	2·33 to 2·47	2·404
Kanagulk	29	0·792 to 39·133	9·752	2·380 to 2·441	2·404
Telangatuk East ..	9	1·732 to 13·204	6·692	2·378 to 2·437	2·408
Nirranda – Stanhope's Bay	155	0·247 to 55·100	2·560	2·37 to 2·47	2·409
Mt. Talbot, Toolondo	5	1·980 to 3·712	2·968	2·392 to 2·424	2·410
Mt. William ..	2	..	..	2·393 to 2·443	2·418
Harrow	33	1·230 to 33·780	8·970	2·386 to 2·468	2·420
General range ..	..	0·065 to 56·482	..	2·330 to 2·470	..
General average ..	..	..	3·514	..	2·407

Victoria (cf. Baker, 1955a, 1955b, 1956; Baker and Forster, 1943). Only complete or nearly complete specimens are considered in these comparisons, and only a proportion of the complete australites so far found in the Port Campbell and Nirranda Strewnfields, have been taken into consideration.

There are statistically significant numbers of specimens for comparative purposes from nearly all of the localities shown in Table 7. The general trend is for specimens with higher specific gravity values to occur in the north-west (Harrow) of the distribution region provided by the localities listed, while specimens with the lower specific gravity values occur in the south-east, in the Port Campbell district, some 125 miles south-east of Harrow. For localities relatively close together, however, such a trend is not apparent (e.g. Kanagulk, Telangatuk East and Mt. Talbot) over the short distances involved; moreover, the average specific gravity value (2·405) for these three closely-spaced occurrences, is nearer to that for Port Campbell than for Harrow, even though situated spatially much closer to Harrow. These are relatively minor discrepancies, however, when fitted into the general provincial trend known to occur across 2,000 miles of the Australian Strewnfield as a whole.

Refractive Index and Specific Refractivity.

The refractive index values determined by the Immersion Method, using monochromatic (Na) light for 16 australites from Kanagulk, 3 from Telangatuk East and 5 from Mt. Talbot, Toolondo, are listed in Table 8, together with their respective specific gravity values and the calculated specific refractivity ($k = (n - 1)/d$). These specimens were so chosen as to represent the several shape groups in the collections, and the variations of specific gravity within and between those shape groups. The table is arranged primarily according to shape of australites, and secondarily according to increase in refractive index values among the individuals of each shape group.

There are statistically insufficient numbers of determinations in each separate shape group to warrant the calculation of their average refractive index and specific refractivity values. Table 8 reveals that the specific refractivity is more or less constant for a range in both specific gravity and in refractive index values, which properties show sympathetic variations within each separate shape group, and from shape group to shape group.

The average refractive index and specific gravity values of the smaller number of complete elongated forms determined, are

slightly in excess of the averages for the larger number of round forms, but the average specific refractivity values are much the same.

Since refractive index and specific gravity values of australites are unlikely to have become radically altered, either during flight through the atmosphere of the primary forms undergoing shape modification, or subsequently thereto while the

TABLE 8.

Australite Shape Group	Listed Number of Specimen	n_{Na}	Specific Gravity	K
Round Forms.				
Button (body portion)	15	1·497	2·383	0·2086
Button (body portion)	39	1·498	2·378	0·2094
Button (body portion)	48	1·501	2·392	0·2094
Button (body portion)	47	1·503	2·409	0·2088
Flange from button	25	1·502	2·404	0·2088
Flange from button	26	1·502	2·406	0·2086
Flange from button	27	1·500	2·395	0·2088
Body of same button	27	1·499	2·388	0·2090
Lens	32	1·502	2·404	0·2088
Lens	44	1·503	2·410	0·2087
Lens	46	1·504	2·414	0·2088
Lens	45	1·506	2·424	0·2087
Round Core	23	1·500	2·394	0·2088
Round Core	2	1·504	2·412	0·2088
Hollow Round-Form Fragment ..	3	1·502	2·400	0·2092
Elongated Forms.				
Oval	7	1·503	2·408	0·2089
Oval Core	16	1·506	2·426	0·2086
Boat Core	12	1·498	2·383	0·2090
Boat Core	4	1·504	2·415	0·2087
Boat Core	17	1·510	2·441	0·2090
Dumbbell Fragment	19	1·498	2·386	0·2087
Dumbbell	42	1·502	2·408	0·2085
"Aerial Bomb"	22	1·501	2·391	0·2095
Teardrop	43	1·502	2·401	0·2091
Summary.				
Averages of all specimens listed in this table ..		1·502	2·403	0·2089
Ranges of all specimens listed in this table ..		1·497 to 1·510	2·378 to 2·441	0·2085 to 0·2095
Averages for round forms		1·501	2·401	0·2089
Averages for elongated forms		1·503	2·407	0·2090

(The listed numbers of the specimens are the same as those in Table 2.)

ultimate secondarily shaped forms were lying upon the earth's surface, it is evident that the differences and similarities existing among these properties as between members of the same shape group and between the separate shape groups, must primarily be a function of the mode of origin at their extraterrestrial birthplace.

Comparisons with Other Localities.

The ranges and average values of the refractive index, specific gravity and specific refractivity of a proportion of the complete australites from the Kanagulk — Telangatuk East — Mt. Talbot district, are compared in Table 9 with those so far determined from different concentration centres in south-western Victoria. Those listed for Mt. William are from Tilley (1922).

TABLE 9.

Concentration Centre	Number of Determinations	Range in n_{Na}	Average n_{Na}	Range in Specific Gravity	Average Specific Gravity	Range in K	Average K
Loch Ard Gorge, east of Port Campbell ..	1	1·513 to 1·515	..	..	2·427	..	0·2080
Telangatuk East ..	3	1·498 to 1·502	1·501	2·378 to 2·408	2·396	0·2085 to 0·2094	0·2090
Kanagulk	16	1·497 to 1·510	1·502	2·383 to 2·441	2·402	0·2086 to 0·2095	0·2089
Mt. Talbot, Toolondo	5	1·501 to 1·506	1·503	2·392 to 2·424	2·410	0·2087 to 0·2094	0·2089
Harrow	2	1·512 to 1·517	1·514	2·431 to 2·446	2·438	0·2103 to 0·2114	0·2108
Mt. William ..	2	1·504 to 1·520	1·512	2·393 to 2·443	2·418	0·2106 to 0·2128	0·2117
General range ..	..	1·497 to 1·520	..	2·378 to 2·446	..	0·2080 to 0·2128	..
General average ..	..	..	1·504	..	2·406	..	0·2094

n_{Na} = refractive index for sodium light; K specific refractivity.

(The specific gravity values listed in Table 9, refer to only those australites for which the refractive index has been determined.)

In Table 9, the specific gravity value of the Port Campbell example is well above the average (2·404) for 212 complete specimens from this field, and since refractive index and specific gravity both increase and both decrease proportionately to yield a constant specific refractivity, it is thus expected that the refractive index value shown in Table 9 for this specimen, is also much above the average. The general trend in refractive index variations across the area of comparison, more or less parallels that shown by the specific gravity variations (cf, Table 7).

Specific gravity and refractive index variations reflect variations in the silica content of natural glasses, both properties showing an increase with decreasing silica (Spencer,

1939, p. 430). Inasmuch as specific gravity and refractive index variations mean variations in silica among the individuals of the separate shape groups (Table 8), and also among the shape groups themselves (Table 8), it becomes evident that physical shape and chemical composition of australites are virtually independent of one another. This is even further stressed by more general comparisons of such properties from east to west across the vast australite strewnfield, although the range of variations is not marked between more closely spaced centres of australite concentration (cf. Table 9).

Acknowledgments.

The author is grateful to Messrs. W. R. Jasper, R. T. P. Elliott and A. C. Bennett of Kanagulk, Western Victoria, and to Mr. L. Officer of Mt. Talbot, Toolondo, Western Victoria, for kindly loaning their australite collections for examination. Mr. E. D. Gill of the National Museum of Victoria (Melbourne) was instrumental in obtaining the specimens for detailed investigation. The australites from Telangatuk East, Western Victoria, were kindly loaned by the Geology Department, University of Melbourne.

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NEW CADDIS FLY GENUS FROM TASMANIA.

(Trichoptera: Plectrotarsidae.)

By Arturs Neboiss, M.Sc., F.R.E.S., Assistant Curator of Insects, National Museum of Victoria.

Summary.

Following the discovery of nine specimens of a Plectrotarsid type caddis-fly from Tasmania it has been necessary to extend some of the family characters of Plectrotarsidae to include *Liapota lavara* gen. et sp. nov. described and figured in this paper. Additional information of the genus *Plectrotarsus* is also included.

Introduction.

Since the description of the type species *Plectrotarsus gravenhorstii* Kolenati in 1848, the correct systematic position of the genus has long been in doubt. First placed in the family Sericostomatidae by Kolenati, and later in Phryganeidae by Banks (1913), the genus *Plectrotarsus*, comprising three species, was finally classified in the monogenetic family Plectrotarsidae erected by Mosely in 1953. Elongated mouth parts were given as a character distinguishing this family from others in the Inaequipalpia division.

The genus *Liapota*, described in this paper, does not possess the above character, but the wing venation and genitalia are an indication of closer association with Plectrotarsidae than with any other family in this division. Summarizing the distinguishing characters in the families with five-segmented maxillary palps in females and fewer segments in those of males, we can separate Sericostomatidae and Philorheithridae* by the absence of ocelli, Phryganeidae by four-segmented maxillary palps in the males, and Limnephilidae by the termination of the radius in the posterior wing.

Family PLECTROTARSIDAE.

Sericostomatidae Kolenati, 1848, Gen. et Spec. Trich. 1:94 (partim).

Phryganeidae Banks, 1913, Trans.Amer.ent.Soc. 39:234 (partim).

Phryganeidae Mosely, 1936, Proc.zool.Soc.Lond. 1936:395.

Plectrotarsidae Mosely, 1953, in Mosely & Kimmins "Trich. Austr. & N. Zeal." :20.

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* The latter family is included for reference as the genus *Austrheithrus* Mosely described in this family cuts across the two main divisions, namely Inaequipalpia and Aequipalpia (Mosely & Kimmins 1953, p. 178).

The following are the amended taxonomic characters of the family to include the new genus *Liapota*.

Antennae not exceeding the length of wings, moderately stout to stout, basal segment bulbous. Ocelli always present. Maxillary palpi of the male three-segmented, of the female five-segmented. Mouth parts elongate or normal. Tibiae and tarsi armed with strong spines, tibial spurs varying—1:4:4 or 2:2:4 on the respective genera. Wing venation similar, or differing in the two sexes, according to species. Posterior wing with strong frenular hairs set at the humeral angle, the number is variable according to genus; radius terminates in the first apical sector or ends blindly before reaching the wing margin; discoidal cell very short.

KEY TO GENERA OF THE FAMILY PLECTROTARSIDAE.

Mouth parts elongate; Spurs 1:4:4; Two frenular hairs at the humeral angle of posterior wing . . . . *Plectrotarsus* Kol.

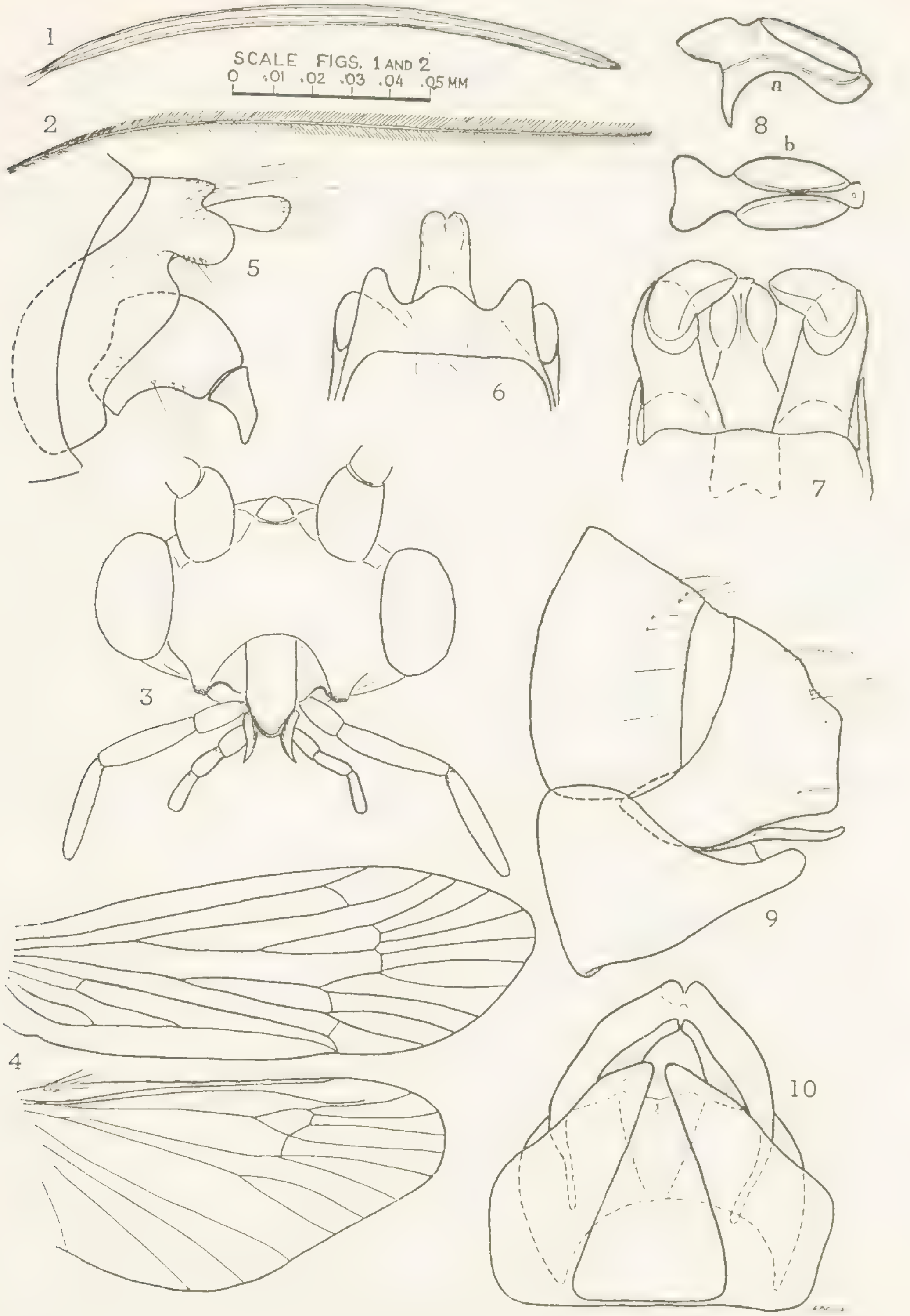
Mouth parts not elongate; Spurs 2:2:4; Four frenular hairs at the humeral angle of posterior wing . . . . . *Liapota* gen. nov.

GENUS *Plectrotarsus* KOLENATI.

Some additional information on the distribution and morphology of this genus has been accumulated by the present author during the past five years.

Tillyard (1918) in his publication of wing-trichiation states that the wing scales of the genus *Plectrotarsus* " always show three or four striae ". Besides this type of scale (Fig. 1) it was found that the anterior wing fringe is formed of feather-like hairs of unequal length (Fig. 2). This type of fringe has been found on specimens of all three *Plectrotarsus* species.

The generic description given by Mosely and Kimmins (1953) p. 21 contains a statement that in the anterior wings " forks nos. 1, 2, 3 and 5 present in the ♂, 1, 2, 3, 4 and 5 in the ♀; all the forks sessile . . . . . ". On comparing this with Figure 6, p. 22 it was noticed that in the anterior wing of the male all forks are sessile as stated in the description, while in the female fork no. 4 is stalked, the footstalk being about equal to the length of the fork. This character is present in the females of *P. gravenhorstii* and *P. tasmanicus* only, whereas in *P. minor* fork no. 4 is wanting. The latter species presents some further differences in the posterior wing venation. Radius is bent downward, merged in the first apical sector, but instead of R1 + 2 being joined to the wing margin, both veins are separated shortly before, thus forming a small additional fork



Figs. 1–2.—*Plectrotarsus gravenhorstii* Kol. : 1, scale from anterior wing: 2, feather like hair from anterior wing fringe.

Figs. 3–10.—*Liapota lavara* gen. et sp. nov.: 3, head from front; 4, ♂ wings; 5, ♂ genitalia lateral; 6, ♂ genitalia dorsal (penis and inferior appendages omitted); 7, ♂ genitalia ventral; 8, penis—(*a*), lateral; (*b*), dorsal; 9, ♀ genitalia lateral; 10, ♀ genitalia ventral.

above fork no. 1. This seems to be a somewhat unstable character, and as Mr. Kimmins informed, is present not only in the females, but also in one male paratype and a suggestion of it in another male. It is therefore necessary to amend the generic diagnosis describing the wing venation.

The anterior wings with forks nos. 1, 2, 3 and 5 present in the males; in some species the females possess an additional fork no. 4 which is stalked. In the posterior wing, radius bent strongly downward and merging in the first apical sector, sometimes separated just before reaching wing margin; discoidal cell very small; forks nos. 1, 2 and 5 present in both sexes. Two frenular hairs at the humeral angle of posterior wing.

Plectrotarsus gravenhorstii Kolenati.

No definite Tasmanian localities are known to the present author. The Australian mainland localities and data are as follows: Victoria - 8 specimens Buxton, 15.XII.1955; 2 spec. Tarrawarra, 29.XII.1953; 9 spec. Tarrawarra, 5.I.1954; 12 spec. Mordialloc (no date); 3 spec. Fitzroy River, 26.XII.1952. New South Wales 4 spec. Barrington Tops, Jan. 1925.

The above localities show that this species is comparatively widely distributed. All Victorian localities are in the vicinity of deep, rather slowly flowing rivers, and wide, partially swampy river flats which are often subject to flooding. No such detailed information on the New South Wales locality is available.

Plectrotarsus tasmanicus Mosely.

The distribution recorded by Mosely (1936) is extended to King Island (Bass Strait) some 50 miles north-west of Tasmania by specimens (3♂ 7♀) collected by J. A. Kershaw, January 1907, and now in the National Museum of Victoria collection.

Plectrotarsus minor Mosely.

This species is known only from a small area on the extreme south of Western Australia. Besides the type locality, Albany, a single female specimen has been taken 10 miles East of Nornalup, W.A. 17.xi.1958 by E. F. Riek, this specimen was available for the present study (CSIRO collection).

Anterior wings in both sexes similar, with fork no. 4 wanting. Posterior wings with radius bent downward, merging in the first apical sector, but sometimes both veins again separated before the wing margin, thus forming an additional fork above fork no. 1. This latter character is found in all known females, and also in two male specimens.

Genus *Liapota*, gen. nov.

Type species *Liapota lavara*, sp. nov.

Spurs 2:2:4. Antennae stout, basal segment large, second short, third and the following ones slightly longer than the second. Ocelli present. Maxillary palpi of the male three-segmented; first segment short, second about two and half times the length of the first, third slightly shorter than second. Maxillary palpi of the female five-segmented, proportional lengths of the first three segments as in the male, fourth and fifth segments each about the same length as third. Mouth parts not elongated. Wings densely covered with yellow and white pubescence. The anterior wing discoidal cell is moderately long and narrow; cellula thyridii slightly longer than discoidal cell; forks nos. 1, 2, 3 and 5 present in both sexes, all sessile. In the posterior wing the discoidal cell is very short; radius bent downward, for a short distance running close and parallel to R2, and finally ending blindly before reaching the apex of the wing; forks nos. 1, 2 and 5 present. Four frenular hairs set at the humeral angle.

The generic name is derived from a Tasmanian aboriginal word "liapota," meaning "creek".

Liapota lavara, sp. nov.

(Figs. 3-10).

Head black, covered with white decumbent hairs; sparse, pale yellowish and erect ones along the posterior ridge. Antennae stout, dark brown. Frons and palpi yellowish brown, the former densely covered with golden yellow hairs, except for a patch of dark brown near the base of antennae; the pubescence on palpae is short, yellow and decumbent. Thorax dark brown; legs yellowish brown, densely clothed with yellow pubescence, spines dark brown, spurs yellow. Anterior wings covered with dense golden yellow pubescence; pattern of white pubescence forming narrow cross lines which are bordered with brown. Posterior wings concolorous yellowish brown.

Genitalia ♂—Although basically of the same pattern as that in the genus *Plectrotarsus* it is quite distinct. Superior appendages short and rounded. Upper penis cover elongate, hood-shaped, with the apex excised at centre. Penis short, bent and widened laterally. Inferior appendages two segmented; basal segment wide, bent strongly downward; second segment short, with distinct ventrolateral ridge, apex pointed.

Genitalia ♀—Ventrally terminates in a pair of somewhat triangular lobes which are connected by a rather transparent membrane. Dorsal plate flattened and excised at the apex, with a pair of finger-like processes just below it. A small ventral process is on the sixth sternite.

Length of the anterior wing, 5·5.–6 mm.

Type material.—Holotype ♂ : Cradle Mtn. Tas.; allotype ♀ : Wilmont, Tas.; 7 paratypes: 2 ♂ 1 ♀ Wilmont, Tas.; 2 ♂ 1 ♀ Cradle Mtn., Tas.; 1 ♂ Strahan, Tas. All specimens were collected by H. J. Carter and A. M. Lea. Holotype, allotype and five paratypes all in the South Australian Museum; two paratypes (♂ ♀) in the National Museum of Victoria (presented by the South Australian Museum). One paratype ♂ from Cradle Mtn. (SAM) is dissected and mounted as a microscope preparation. *Distribution*—North-West Tasmania.

The trivial name is derived from a Tasmanian aboriginal word meaning " little ".

ACKNOWLEDGMENTS.

The author expresses most sincere thanks to Mr. G. F. Gross, of the South Australian Museum, Adelaide; Mr. E. F. Riek, Division of Entomology, C.S.I.R.O., Canberra; Mr. D. E. Kimmins, British Museum (Natural History), London, and to Mr. A. McEvey of the National Museum of Victoria, Melbourne, for loan of the very interesting material, and their valuable criticism.

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A NEW SPECIES OF THE *CYPRAEA* SUBGENUS *NOTOCYPRAEA*.

By R. J. Griffiths.

Specimens of *Cypraeidae* collected in the area of Western Port Bay, Victoria, Australia, differ from specimens of the known species of the family. The differences are so considerable and consistent that it is clear that the new specimens belong to a hitherto undescribed species.

Family CPYRAEIDAE.

Cypraea (*Notocypraea*) *wilkinsi* sp. n.

Holotype. Shell ovate, with a broad anterior end, labial side callous, shell otherwise thin, and light in weight; spire protruding slightly above the top of its pit. Dorsum bright flesh in colour, sides and ends paler, base tending to be white, especially on the columellar side; no dorsal bands. On the labial callus there are about forty very small pale brown spots, with ten or so more or less in a line on the opposite side of the shell. Aperture fairly wide throughout, constricted towards the front on the labial side. Basal teeth small, on the columellar side not extending onto the base. Fossula shallow, crossed by extensions of the teeth; its lower edge projects only slightly into the aperture; the shallow columellar sulcus merges with the fossula. Interior of the shell pale flesh in colour.

Animal. Tentacles pale orange, darker at ends; tapering in shape, with rounded tips. Siphon pale cream, almost translucent, with no papillae at the edge. Mantle translucent, colourless or very pale orange, almost invisible when extended over the shell; marked on the left with about twenty patches composed of dark dots; mantle papillae unbranched, mamilliform, with tips rounded; about twenty such papillae on each side. Foot very pale cream, also almost translucent, with some raised tubercles on the sides; it extends behind and on both sides of the shell when the animal crawls.

Radula. The radula is sketched in Figure 1.

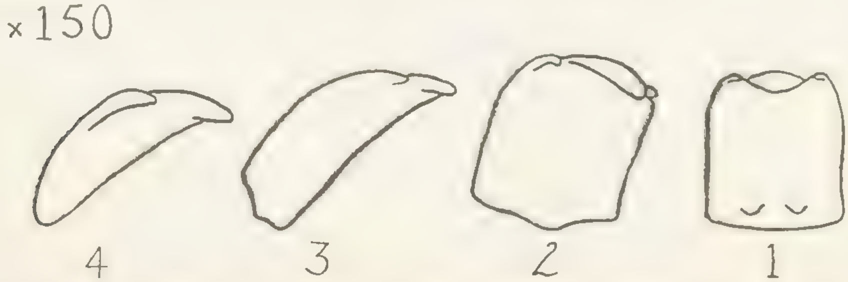

Fig. 1.—1 central, 2 lateral, 3 first marginal, 4 second marginal.

The radula, which is 8 mm. long and 0·4 mm. wide, has 70 rows of teeth.

Juvenile shell. A single dead specimen of a juvenile (oliviform) shell was found under the same stone as the holotype. It is almost cylindrical in plan view, and pale flesh in colour. There is no trace of dorsal bands.

Variation. The shell characters of the paratypes show considerable variation, particularly in lateral spotting (absent in some shells), in the extent of the protrusion of the lower edge of the fossula into the aperture, in weight, in aperture width, and in the constriction of the anterior labial side of the aperture.

The type locality of the species is Victoria, Australia—Flinders south beach through Western Port Bay to San Remo.

MEASUREMENTS.

TABLE 1.

	Holo-type	Paratypes No. 2	3	4	5	6	7	Mean	Para-type No. 1
Length (mm.)	24·3	18·9	28·7	21·9	19·7	30·1	25·5	24·2	12½
Width (percentage length) . .	54	59	56	54	56	53	58	56	52
Height (percentage length) . .	44	47	46	43	46	43	47	45	40
Number of labial teeth (*A*) . .	27	26	28	29	26	30	27	28	. .
Number of columellar teeth (*A*)	24	23	26	23	23	24	26	24	. .
Protrusion of lower edge of fossula (percentage length) . .	2½	3¼	4½	4½	4	4	3¼	3·7	. .
Weight ($\times 10^4/L^3$) (*B*) . .	1	1·3	0·7	0·8	0·8	0·6	0·7	0·8	. .
Angle of aperture (*C*) (degrees)	34	45	48	44	42	57	47	45	. .
Width across aperture (*D*) (percentage length)	9	8½	10	9½	10½	11	9¾	9·7	. .

NOTES.—A. Corrected to a shell-length of 25 mm. See Schilder and Schilder (1938). All teeth and ridges except the anterior columellar ridge were counted.

B. The factor of 10^4 is introduced to facilitate handling of the results.

C. This is the angle between the tangents to the front and rear of the aperture.

D. Measured from the tip of the front columellar tooth to the line joining the tips of the two nearest teeth to the labial side.

Specimens examined. A holotype and seven paratypes are nominated. Some worn beach shells were also examined, but their condition was not good enough to warrant their being declared type material. Details of the type specimens are as follows:

Table 2.

Specimen	Where situated	Where collected
Holotype	Shell and radula in the National Museum, Melbourne; ref. F19903	Flinders south beach. Found by the author under a stone at low tide, 2nd March, 1958
Paratype No. 1 (oliviform)	Author's collection; ref. No. C.2	Under the same stone at the same time as the holotype
Paratype No. 2 ..	Author's collection; ref. No. C.3	Dead on Flinders south beach, February or March, 1958
Paratype No. 3 ..	Author's collection; ref. No. C.7. Formerly in the Gatliff Collection in the National Museum; ref. F19979	San Remo
Paratypes Nos. 4–5 ..	National Museum, Gatliff Collection; ref. F19979	San Remo
Paratypes Nos. 6–7 ..	Collection of Mr. C. J. Gabriel.	Dredged alive in Western Port Bay; on bryozoa.

Photographs of the holotype and of some of the paratypes are given in Plate I.

Apart from the type specimens, other shells examined were three dead shells from Flinders south beach and one dead shell from Ulverstone, Tasmania; all are in the author's collection. Two of the Flinders shells (ref. C.4) are undoubtedly members of the new species. The other two shells (ref. C.5 and C.6 respectively) are probably but not certainly referable to it.

REMARKS.

Although *C.wilkinsi* is clearly distinct from all other species of *Cypraea,* two " varieties " described by Beddome superficially resemble it. Reference to Beddome's papers (1896, 1898), however shows marked differences. *C.albata* Beddome 1898 (length 25 mm., width 72 per cent. of length, height 60 per cent., 24 labial teeth) is described as snow white, with a heavy labial callus; it is proportionately much wider and taller than *C.wilkinsi.* *C.subcarnea* Beddome 1896 (length 24 mm., width 67 per cent., height 50 per cent., 21 labial teeth, 20 columellar teeth) is also wider and taller, with sides and ends more callous, and with fewer teeth; it has larger and more distinct labial spots, and the general shape of the shell is more ovate.

The retention of the generic name *Cypraea* L.1758 and the use of the name *Notocypraea* Schilder 1927 only as a subgenus is based on the reasons given by Kay (1957); it can also be justified on conchological grounds.

The new species is named in memory of the late Mr. G. L. Wilkins, who formerly worked in the Mollusca Department of the British Museum (Natural History). I am glad to have this opportunity to acknowledge, on behalf of all those he helped, the generous and unstinted assistance and encouragement he gave to so many people.

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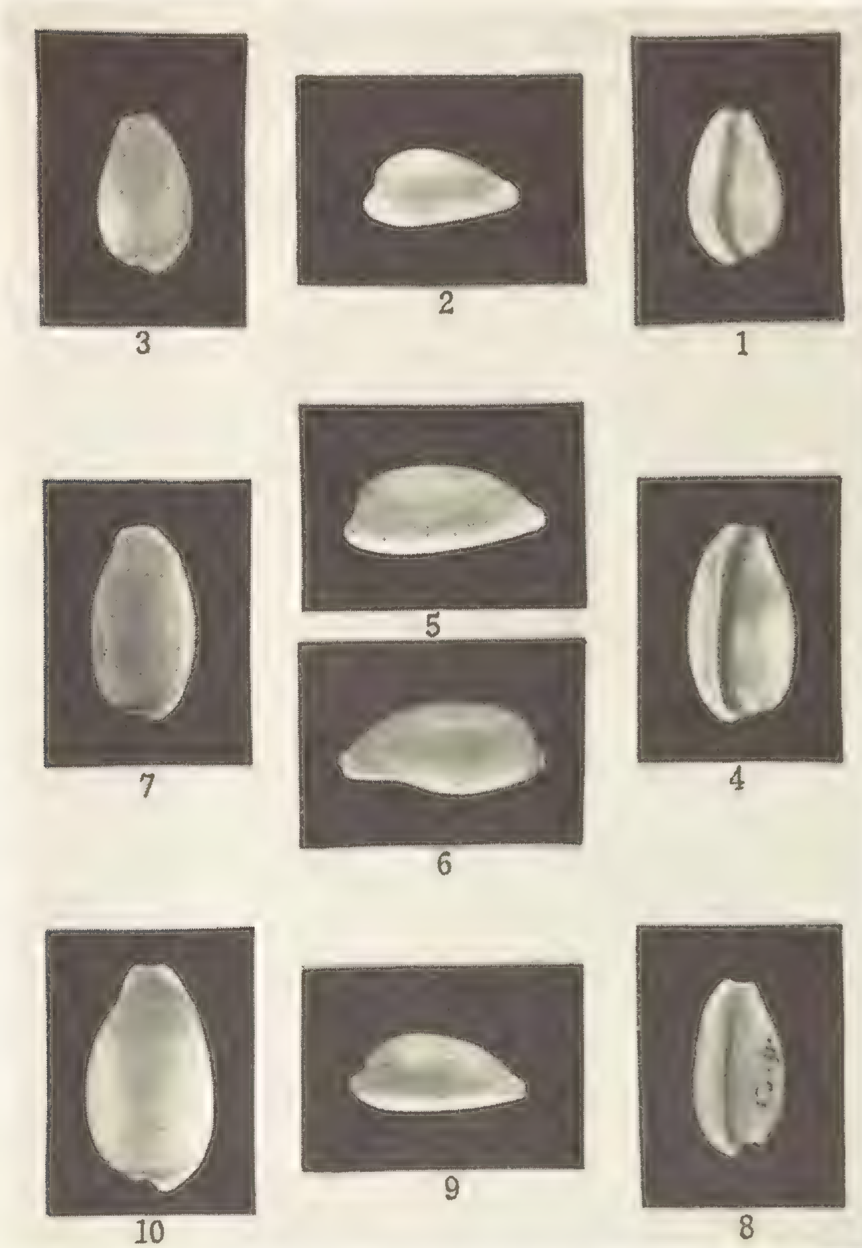

PLATE.

Cypraea (Notocyprae) wilkinsi.

(approximately natural size.)

1–3.—Paratype No. 2.
4–7.—Holotype.
8–9.—Paratype No. 4.
10.—Paratype No. 3.

BIBLIOGRAPHY OF PRINTED LITERATURE UPON VICTORIAN ABORIGINES.

By Aldo Massola, Curator of Anthropology, National Museum of Victoria.

INTRODUCTION.

This Bibliography, as the name suggests, deals only with printed literature (excluding newspapers) upon the Aborigines of Victoria. In some cases, however, as in the Monographs by D. S. Davidson, the original papers deal with the Natives of Australia as a whole. These have been included because they contain also Victorian material.

The present writer has seen most of the works here enumerated but some *Rara Avis* he has not seen are included because reference to them is made by reliable Authors.

A number of works have been omitted because their references to the Victorian Aborigines were too scanty, or of no scientific account. The Author hopes that nothing of any importance has been overlooked. If it has, he would be interested to hear about it.

The material has been presented in geographic and subject divisions, treated together and strictly alphabetically. Every item has been cross-referenced, and an Author Index, referring to the divisions, is added.

In dealing with any particular subject or locality, such as, say, Dartmoor, the user of this Bibliography must also remember that Dartmoor is on the Glenelg River, in the Western District, and that reference to it could also be found in works under General. The serious worker must consult all these divisions. In the case of General, this includes works dealing with Victorian subjects and localities as a whole, such as R. Brough Smyth's "Aborigines of Victoria", or A. W. Howitt's "Native Tribes of South-East Australia".

Smyth's work, as also E. M. Curr's "The Australian Race", have been dissected, as they contain papers by innumerable Authors.

I must acknowledge the great help rendered me by the Librarian of the National Museum of Victoria, Miss J. M. Shaw, B.A., who not only typed the entire proof, but re-checked almost every reference for proper rendering of Authors' names and dates. I must also thank the Officers of the Public Library of Victoria who have always given me every assistance. To all others who assisted in any way whatever my grateful thanks are offered.

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